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1986

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IN THIS ISSUE

Education and India in 21st Century

Convocation

Anna University, Madras 11

News from Universities

Chemical Education in India: Challenges of the 21st Century 17
New Courses at Burdwan University 19
AP Open University to offer new courses 19
Sanskrit Vidyapith in West Bengal 19
Public lectures on health care 19
Postgraduate studies at Sher-e-Kashmir University 19
Relief to teachers in Delhi Colleges 19

AIU News

Bharathiar University hosts AIU Meetings 20
Theses of the Month 23
Current Documentation in Education 25
Classified Advertisements 30

Opinions expressed in the articles and reviews are individuals and do not necessarily reflect the policies of the Association

Editor :
SUTINDER SINGH

Education and India in 21st Century

Biman Sen*

Learning Process — structure and contents

If we critically analyse the evolution of learning system, it would be clear that its structure and contents are determined by the requirements of higher education which are closely linked with the objectives and purposes as determined by the ruling elites. But the situation has now changed, It is people's aspirations that should determine the contents and structure of education and training system and not the dictates of a few individuals.

Science and technology has also created a unique situation, in which, human beings can achieve the ultimate goal of a utopian world free from all drudgeries and tensions. This will create conditions for more and more leisure. It is, therefore, expected that 21st century will also be an age of creativity. Education and training for creativity and leisure should be an important component of the new learning system.

Since science and technology are universal, types, quality or competence of man-power requirement for development of science and technology, their application and management for economic or industrial development of a country cannot be different from any other. Therefore, logically the basic structure or contents of education should not be different from country to country. The character of education has to be universal. Unless this fundamental position is understood, the difference between the developed and developing countries can never be bridged, rather the gap is found to widen more and more. So long there is a gap between them, neither peace nor stability in the world could be achieved. With development, structure and contents of education and training should change. They should, therefore, be flexible and sensitive to change as time demands.

In the present circumstances, it has been more or less accepted in principle that to sustain a modern society. Twelve years of schooling is necessary which is to be followed by three to five years of basic tertiary education at the level of a university first degree, followed by post-graduate degree and research for a selected few who can effectively benefit from higher education.

Tertiary education and training has to be tuned to economic and industrial policy and its management. Twelve years of schooling has already been divided into ten years of foundation education or basic cycle followed by two years of higher secondary school education and training.

Educational Component

While deciding the basic contents of educational component at various levels, it is necessary to keep in view the following major factors:

(1) Education is holistic in nature, therefore educational component of the learning system should aim at continuous upgrading of knowledge and information from beginning to end of an educational process.

**Executive Director, International Educational Consortium and Former UNESCO Expert.*

(2) The world is moving towards forging a common human society and now passing through a transition of regional societies comprised of different nationalities in a particular region like SAARC, EEC, ASEAN etc. In order to accelerate the process, and lay the foundation of peace and stability in this world, it is necessary to reorient the educational system in a common basic pattern and remove portions of contents which stand in the way of achieving the common goal and which inculcate in the minds of younger generation, regionalism, parochialism, religious fundamentalism, narrow nationalism and all other chauvinistic attitudes.

(3) The contents should be relevant to the life-pattern which is going to be in 21st century society and not based on past or present practices.

(4) Since 21st century is going to be a highly sophisticated age of science and technology, and creativity, production of sophisticated scientific, technical, managerial and other highly creative manpower becomes the key to success of all developmental activities which will lead India to 21st century with confidence, competence and speed. The quality and type of such manpower depend on the competence of the delivery system. Therefore, contents of education at the tertiary sector should determine the contents of basic and higher secondary school education and not otherwise.

(5) After basic communication, i.e. learning of languages at all stages of education, the most important subject of study should be Mathematics specially at the school stage right from the beginning to develop systematic logic, power of analysis and synthesis. In order to develop scientific temper, spirit of enquiry, understanding of environment and also to form a sound foundation for higher education, it is absolutely necessary that study of science should be made compulsory throughout the school stage in graded form for continuous upgrading of knowledge and information.

Teaching of science at the higher secondary level should specially be made compulsory because secondary school education serve not only as a link between foundation education and higher education but at the same time, it should serve as a bridge between education and training, and world of work and life. Psychologically and sociologically, higher secondary school education deals with a very sensitive age group who want to retain all the privileges of childhood and try to exercise all the prerogatives of adulthood without assuming the duties and responsibilities of adults. It also serves as a transition between pupil stage to student status. At this stage, academic responsibility has to be gradually passed on to the taught from teachers.

(6) Every student should be given lessons on history of science and technology and evolution of human society from animal existence to sophisticated modern man in a graded manner *for better human understanding.*

(7) With the advancement of science and technology, there has been tremendous explosion of knowledge and information, and such knowledge and information are more than doubling within three to five years, this period is fast becoming shorter and shorter. Education therefore, cannot any more remain as an one time exercise ending in a single educational programme but it should be a life-long exercise, as the 21st century society is going to be a learning society. Therefore, pattern of education needs a change periodically at all levels. Self-contained modular system may be the answer, as this gives flexibility and opportunities for a learner to go at his her own speed and level of understanding. It also gives flexibilities to replace the obsolete modules with new modules without major change in the whole system.

In view of this, it is desirable that for an effective and efficient educational system, there should be a built-in-mechanism in the system for continuing education, for continuous upgrading and improvement of knowledge and competence of persons already engaged in various activities. Such educational programmes should be organised by carefully monitoring the changing trends of the environmental situations and their projected needs.

(8) The requirements of science and technological education will be a major factor for programming development of total educational and training system. Science and technical education and training are linked up with gradual upgradation of technology for increasing productivity. If we analyse the present technological environment and its changing trends, specially created by the energy crisis during the last decade or so, major efforts for technology upgrading have been devoted to development of

energy economising processes and search for new sources of energy, which have brought about automation in a big way. The other area where there has been development explosion is electronics which is responsible for a major technological revolution and for changing the complete concepts of production and distribution and future life-styles of an average human being. It may also revolutionise the entire education and training system in future.

India has already entered the realm of high technology. Within the next ten or twelve years, unless she enters in a big way in the field of electronics with special reference to microprocessors, computers, sophisticated electronic control systems and other high technology areas, the country's progress will retard and gradually slide back. Use and production of high technology will need a massive support of R & D (Research and Development) activities, which can neither be sustained nor developed without a sound system of science and technical education. It may be correct to say that this will need a sound techno-scientific educational system with a futuristic outlook.

High technology needs sound inter-disciplinary group activities. Such group activities normally include theoretical and experimental physicists, mathematicians, chemists, electronic engineers, metallurgists, mechanical engineers and many other professionals drawn from diverse disciplines depending on the areas of activities. Even at the level of technician, inter-disciplinary knowledge is becoming an essential requirement.

(9) As the technological environment is changing towards group activities, involving scientists, technologists, engineers, mathematicians, the fundamental approach to planning of technical and science education should be based on educational team building, both at the degree and postgraduate levels, with high degree of inter-disciplinary mobility both vertical and horizontal, by breaking down the present rigid barrier between science and technology and also between the various disciplines within science and technology or engineering. This will need drastic revision of curriculum of both science and technical education and provision for dual degree both in science and technology at the first degree level in the pattern of the Birla Institute of Technology and Science, Pilani.

In the changing socio-economic situation in 21st century, professional engineers, scientists etc., will have to shoulder greater social responsibility and ultimately they have to assume leadership of the communities. Therefore, professional education like technical or science education programmes have to be based on much broader perspective than to produce persons with professional competence alone. In this respect, as early as in 1976, UNESCO, General Conference had laid down certain broad guidelines for development of technical education programmes to humanise it to serve the changing needs of the modern sophisticated techno-scientific society of 21st century when a professional person will have to assume both social and moral leadership of a global society.

Educational planners should keep in mind that with greater and greater sophistication of technology, knowledge of miniaturisation, computerisation of information and its application and retrieval, new material, economisation of energy consumption, renewable energy sources, application of bio-technology and genetic engineering etc., should be built in the educational programmes at the degree level. In formulating any degree programme, it should be kept in mind that electronics and communication will be the most important discipline, the bed-rock on which all future technology will depend. Therefore, study of basic electronics has to be the core component of all technical and science education at degree level. This will need strengthening of study of basic physics, chemistry and mathematics. In addition, substantial doses of behavioural sciences and humanities need to be incorporated in technical education, which should be broad based, flexible and sensitive to change with a hard core of study of fundamental and behavioural sciences and languages. Keeping all these in mind, it should be determined whether the duration of degree courses should be four or five years or more according to specified need and not by mathematical calculation like 10+2+3 years.

Training Component

As regards, training component of the learning process at the degree, and post-graduate levels, apart from the practical training obtained from the institutional facilities, there should be practice school system, on the model of the Birla Institute of Technology and Science, Pilani to give enough opportunities to the students to work on live-problems in actual working situations. This should be followed by a project report or thesis for testing the achievement of the students before they leave their institution.

Since, it is not possible to simulate actual working situation in high technology fields in any institution, learning through observation (Lo) should be considered an important component of training. This can be achieved through regular programmed visits to technical and industrial establishments. Such visits, as a part of education and training, should not be confined to only technical institutions but should be extended to *all degree students including science and humanities.*

Learning through library work should also be compulsory for all students irrespective of their field of studies or stage of study.

As regards social sciences and humanities, similar approach should be adopted, with minor variations. Every student of humanities and social sciences should be familiarised with the use of computers and word processors and other instruments which help to improve learning process.

All postgraduate and research students should be given limited teaching assignments through tutorials and group activities like group discussions and problem solving activities.

The most difficult problem is perhaps planning of programmes for higher secondary school stage. It should be understood clearly that polytechnic education and training given at the Industrial Training Institutes (ITIs) are an integral part of the Higher Secondary Education and vocationalisation is not vocational training. Whereas vocational training is primarily meant for development of some particular skills, vocationalisation is to develop in an individual work ethic and ethos and inculcate dignity of labour.

Planning of higher secondary education and training is difficult, because it not only serves as link between shool education and higher education for smooth transition but it also has to serve as a bridge between education and world of work for majority of the student population. Therefore to a great extent higher secondary education and training should be self-contained with provision for growth through future education.

To prepare an individual to be an effective for socio-economic development in 21st century, it is essential that every student at the higher secondary stage should get the same education covering study of languages, basic sciences and mathematics. However, training component and other subject studies may differ according to the objective and purpose of the course of study. This will mean educationalisation of polytechnic and ITI education and training and vocationalisation of the general higher secondary education. Whereas, training at the polytechnic level should aim at developing technical supervisory and allied skills required for production and maintenance of industrial establishments to function effectively as lower and middle level managers; areas of vocationalisation should be based on usefulness of the training to an individual and also to function as a useful member of the society.

To identify these areas, it may be necessary to analyse different phases of human activity. Normally, an activity may be divided into three main phases : Pre-*production stage, Production stage and Post-production* stage. Major elements in each of the three phases are given in Table I.

Table I

Phase I Pre-production stage	*Phase II* Production stage	*Phase III* Post-production stage
a. Need of a project	a. Production planning	a. Packaging
b. Objectives & purpose	b. Inventory control	b. Storing
c. Macro-planning stage	c. Procurement of raw material	c. Marketing and sales
d. Financial arrangement	d. Production process	d. Transportation
e. Building infrastructure	e. Quality control	e. After sales servicing
	f. Research & Development	

On the basis of activity analysis, it may be observed that in the Phase I, most of the personnel required should be professionally qualified persons. However general higher secondary school finishers can play some useful role as clerical assistants and in other allied field of similar status. However, at this phase, important role can be played by polytechnic and ITI products as aid to professionals.

So far as phase-II is concerned, apart from highly professionally qualified personnel, there will be need of a large number of technicians, operators and skilled workers i.e products of polytechnics, ITIs, apprenticeship scheme. However, at the phase -III, general higher secondary school leavers can play a very useful role, if proper training is provided to them under vocationalisation scheme.

In programmes for vocationalisation, there should be adequate provision for pedagogic training and training in health services and nutrition, as education and health sectors will provide largest employment opportunities. Implementation of vocationalisation scheme, is really a problem of management rather than formulating a worthwhile training programme.

As regards basic cycle of education and training it should be ten years, which is the minimum learning period required for sustaining the benefit of education and also to derive full benefit of the continuing education at a later stage of life. This ten year's basic cycle may be devided into six years of elementary education followed by four years lower secondary education.

For first six years of basic cycle, there should be more emphasis on Lo (Learning through observation) and Lt (Learning through training) components. Le (Learning through education) should be restricted to mainly learning of languages and Mathematics.

At the elementary stage, the most important by component is the learning through observation mainly familiarisation with environment and also through visual media like charts, pictures, slides, etc. to develop the power of perception, spirit of enquiry and scientific temper. This should include environmental education, comprising a study of local flora and fauna. This will need frequent visits to various places in neighbourhood of the schools. As regards Lt component, it should aim at developing creative abilities and temperament, using available local media and materials.

At the lower secondary cycle, alongwith languages and mathematics study of sciences should be introduced together with social services and visits to places of interest in the neighbourhood including technical establishments and industry, if any. So far as training component is concerned, it can be accomplished partly through social services and partly through attachment to various extension service centres, like agricultural extension centre, primary health centres etc.

One of the most neglected areas in our education and training is physical education and training. In most of the schools and colleges, it is provided in name only except in some selected institutions. In colonial days, no provision for physical education and training was made as a matter of policy. Whereas physical education takes care of health and hygiene, including nutrition, physical training takes care of body building, coordination between thoughts and physical action. It also develops better human understanding and tolerance. Swami Vivekananda said:

> "Our young men must be strong, religion will come afterward. Be strong, my young friends, you will be nearer to heaven through football than through study of Gita. You will understand the Gita better with your biceps, your muscles, a little stronger."

All students irrespective of the stage of education should be encouraged to join youth movement like National Cadet Corps, Scouts movement, adventure camps etc. as these movements have stood the test of time. In fact, Physical Education and training should be compulsory right from beginning of education to the end and should be included as part of regular curriculum.

As regards, compulsory education upto the age of 14 years, it is more an economic and management problem rather than an educational problem. The provision in the "Constitution" in this respect, was not based on any serious scientific studies or research, it was based more on emotion and imagination than on scientific facts like financial and other logistic problems etc. The Constitution makers, were so surcharged emotionally, that they had hardly any time to think of financial, human resources and other problems, at the time of providing a time frame for universalisation of education upto the age of 14 years in the Constitution.

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In our anxiety to achieve the target laid down in the Constitution, we have done immense harm to the development of education sector. The limited funds available for education have been thinly spread over a large area, consequently development of higher education has suffered badly and the target of universalisation of primary education could not be attained. Moreover, single teacher school is no education in this age of science and technology.

Provision of single teacher schools goes as high as 78.5% in J & K, and 72.5% in Karnataka.

TEACHERS AND TEACHER TRAINING

Teachers are the heart and soul of any educational system. No technology can ever be able to replace a good teacher and face to face teaching. With the sophistication of technology in education and trainng, the role of a teacher is becoming more and more complex and his/her work is becoming more and more difficult. To use the modern technology to the best advantage, a teacher would have to harmonise teaching with the use of appropriate technology. This will need basic knowledge of technology used and advance programming of lessons with proper synchronisation of media to be used in a particular situation of teaching or demonstration. This is an art which cannot be provided by the present system of training programmes, like B.Ed. or B.T. More than pre-service training, in the changing technological environment in-service training will have to play a more important role in familiarising with the newer technology coming into learning system.

As regards training of teachers for university degree level education as well as for Higher Secondary Education, since the teaching personnel would normally be recruited from persons having post-graduate or research degree, there should be built in provision in their education for teaching practice under the supervision of an experienced professor. It should be made obligatory for all postgraduate students and research workers to take some minimum number of classes/tutorials during their training period.

As regards teachers for the elementary classes in schools, they should normally be recruited from the persons who have completed successfully their higher secondary school education with pedagogic training under +2 years programmes. Such teachers can also be used for lower secondary education alongwith graduate teachers.

All teachers should be given in-service training every five years or whenever there is a change in the curriculum or technology. Such training should be arranged in collaboration with the NCERT (National Council for Educational Research and Training) for school teachers and for college teachers in collaboration with a selected group of universities. For technical education, such training programmes may be arranged in collaboration with Indian Institutes of Technology, Regional Technical Teachers Institutes, etc. All in-service training should adopt self-contained modular system.

UNIVERSALIZATION AND VOCATIONALISATION

As regards the universalization of elementary education and adult literacy, both are bye-products of economic development. In a purely socialist country like USSR or Hungary, it is not difficult to introduce compulsory education at the school stage, as there is equitable distribution of wealth and state controls the economy and has adequate hold over its population. Even in such countries, compulsory school education could only be introduced some time after gaining political power and not immediately. However, experiences of the non-socialist countries tell us that it had been possible to introduce compulsory school education, only after the economy reached a minimum threshold level. In a country like India, which has adopted mixed economy, it would never be possible to reach the target of compulsory eight years of schooling till the Indian economy reaches the minimum threshold level, even if we spend the entire GNP for the purpose by orthodox method. However, it may not be difficult to achieve a reasonable target through full participation of people in the programme both for universalisation of elementary education as well as functional literacy effectively, in the following manner.

(1) All physical infra-structural facilities like school buildings, teacher's residential accommodation should normally be provided by the local community either by way of labour or by providing funds for the purpose.

(2) The school buildings should be used for functional literacy and also for cultural and welfare activities when the buildings are free.

(3) All available local talents irrespective of their age or sex should be mobilised to the extent possible for promotion of various learning programmes.

(4) It is understood that every year, about 80,000 to 85,000 defence services personnel are demobilised. They are highly motivated and disciplined people and also well trained. Their services could be utilised for various educational

and training programmes. Before demobilization they should be given some pedagogic training. However, they should be given adequate social status.

(5) Services of all extension officials, like agricultural extension officials, primary health officials etc. should be utilised for the purpose. In fact, such officials cannot be functionally effective, unless they are involved fully in training and educational programmes.

(6) Every higher secondary school should adopt a group of elementary/lower secondary schools located in their neighbourhood, rather from their catchment areas.

(7) Two years of national service should be made compulsory for all higher secondary school leavers, except those who could successfully get admission in professional institutions like medical colleges, technical institutions or agricultural colleges etc. No student should be admitted either for the University Courses or to the world of work, unless he/she produces a national service certificate issued by competent authorities. During national service, such peoples' services should be utilized for development programmes related to education and health services.

Those who are able to obtain admission in professional institutions, their national service should be deferred till they finish their studies. Their services should be utilized for development programmes requiring qualified people. However, their national service period may be reduced to one year. This arrangement will not only solve the problem of adequately manning the schools specially in rural areas but will also reduce the pressure on higher education.

As regards vocationalisation of higher secondary education general stream, there should be a large number of self-contained modules, and every student should be asked to select one or two such modules.

As it is impossible to provide large number of modules in any single school, there should be provision of vocational centres which can also be used as hobby centres for youths in the spare time. Facilities in each such centre should be used for a group of higher secondary schools located in the neighbourhood by proper adjustment of working hours for each school. It will not be difficult to do so with the help of computers and provision of transport facilities. Such arrangement will have two distinct advantages: (i) Use of facilities could be maximised and human resources needed could be fully utilized; and (ii) students will get larger number of choices for selecting modules of their choice.

MANAGEMENT AND ADMINISTRATION OF EDUCATION/TRAINING

If we compare the management and administration system of pre-independence period with post-independence period, it would be observed that there has been gradual deterioration of the system, through erosion of the authorities of the heads of academic institutions and too much interference in management of institutions by both politicians and bureaucracy.

In the pre-independence period, a Vice-Chancellor of a University, a Principal of a College and Headmasters of schools used to command respect and had the authority and power to deal with the problems of their institutions within the rules and regulations prescribed for the purpose. What is the position of a Vice-Chancellor of a University today? He can remain in office so long politicians or bureaucracy want him. A Principal has hardly any power to operate smoothly, he is sandwiched between bureaucracy and indisciplined teachers backed by politicians. As regards the plight of a Headmaster of a school, except some public schools, least said is better.

In the pre-independence period, teachers had sense of duties and responsibilities, they were motivated and dedicated lot, although their conditions of services and salary scales were worse than those of an assistant of the Central Secretariat. Today, thanks to politicians, teachers have become unionists, they only know their rights and not their duties and responsibilities. Majority of them have hardly any motivation or commitment to education, although their salary scales and other facilities are comparable to those of the officers of the Central Government or even better. Therefore, the greatest challenge for reform of education and training system of the country is to introduce management of change, and to bring back discipline into the system.

If the Government is really serious to reform present education and training system to meet the challenges of 21st century, all educational institutions from elementary schools to University level should be granted autonomy to function within prescribed limit. The Head of an institution should clearly understand that he/she is not an administrative head but a manager of change, an action centre leader and not an administrative boss. Every institution should have a governing body for monitoring and evaluation and for promoting growth and development. Its function essentially should be to assist the Head of the Institution in his/her work and not to hamper his/her functioning. At the basic cycle school level, such governing body should be composed of representatives of teachers, parents and local community having knowledge of education. At the higher secondary school level, such governing body should consist of representatives of teachers, parents, students and users of school products.

At the level of higher education, the governing body should be composed as provided by the rules and regulations of the University/higher institutions. However, it should ensure that students and users are well represented.

With the provision of autonomy to the educational institution, the responsibility of the government, specially the Central Government will become greater in respect of coordination and maintenance of standards of higher education and research and technical education.

For integration of the country and to check fissiparous tendencies, it is necessary for the Central Government to be armed with proper constitutional provision at the school level also. It was for this reason that Mrs. Indira Gandhi amended the Constitution and brought education under the concurrent list. For reforms of education to be successful, it would be necessary for the Centre to introduce suitable legislation and executive measures to assume power; to prescribe uniform core curricula for school education; to monitor and evaluate school curriculum of any State as and when necessary through NCERT or some other organisation; and to ask the State Government to revise their curriculum, if there is anything objectionable either in the syllabus or teaching materials which may go against the overall national interest and policy.

As for higher education and research, there is adequate provision in the Constitution which empower Union Government to assume power for coordination and maintenance of standards of higher education and research and technical education under Article 246—7th schedule Union List—I provision under 66 entry. Unfortunately, the Union Government has so far not operated on this constitutional provision, except in a limited way by establishing the University Grants Commission under the UGC act, 1956. Thus, the Union Government has failed to discharge its constitutional responsibility specially in the development of technical education which has resulted in haphazard development of technical education ignoring all the canons of standard prescribed by the A.I.C.T.E. (All India Council for Technical Education). The A.I.C.T.E. was established in 1945, to advise the Government of India in all aspects of development of Technical Education in India by a Government resolution. Had this organisation been given the statutory power under the Constitution, the picture of technical education would have been different. It is not too late to retrieve the position and to operate the constitutional provision and give All India Council of Technical Education, statutory power to regulate development of technical education of standatd and quality. The A.I.C.T.E. should also be given the power to register all qualified technical personnel as is done by the Indian Medical Council. No body should be allowed to practise in the profession without registration with A.I.C.T.E. The responsibility of registration may be entrusted to ISTE or professional bodies by A.I.C.T.E. This will improve the standard and quality of technical education and technical personnel which is the key to economic and industrial development of the country.

The University Grants Commission was established in 1956 under UGC Act to maintain standards in the University sector. Unfortunately, the UGC today has become a part of the Ministry of Education and a victim of bureaucracy. In fact, the UGC is a para-governmental body. Its Chairman, Vice-Chairman and Secretary are appointed by the Government and other members are also nominated. It is highly weighted by the representatives of the government. It is, therefore, subjected to political pressures. Moreover, under section 20 of the UGC Act, "Commission should be guided by such direction on the question of policy relating to national purpose as may be given to it by the Central Government". Thus it has forfeited its academic freedom. Today, it has only become a fund disbursing organisation, and over the years the power has shifted from the Commission to its Secretariat. It is felt, even if the UGC is revamped, it will neither be able to coordinate the activities nor to monitor or evaluate the standards of higher education and research as there are many organisations dealing with higher education and research which are outside the jurisdiction of the UGC. Therefore, the power of monitoring and evaluation should be given to an organisation like the Association of Indian Universities on which the heads of all the higher educational institutions are represented. The Association should be given statutory power and made responsible for coordination and maintenance of standards. Being an organisation of Vice-Chancellors and Directors of all Indian institutions, it will be able to operate effectively, resist political pressure and act independently.

EQUITY AND EXCELLENCE

Technical and science education (including medical science) are responsible for training key manpower required for economic and industrial development on which entire future of the country depends. Therefore, the country cannot afford to dilute the standard of such education to accommodate any special category of people in the name of equity of opportunity. Equity and Excellence cannot go hand in hand as equity demands democratisation of opportunity and excellence demands selective discriminations. Therefore, admission to higher education and research specially in technical and science education should be based only on merit. Selection for such courses should be based on competence, academic performance and motivation and no other consideration. In order to promote excellence, to back up R & D activities and competitive production, there is a need for provision of a group of institutions like Indian Institutes of Technology, Indian Institute of Science, All India Institute of Medical Sciences and similar institutions, at all levels of education to nurture talent. These institutions will have to be treated on special footing in respect of provision of physical facilities, funds and other infrastructures.

The science department of universities specially in the areas like Physics, Chemistry, Biology, Mathematics need to be strengthened. Basic researches in science should not only be encouraged, but also supported liberally. Science and technology are the two faces of the same coin and one cannot survive without the other. More so in 21st century, which is going to be a highly sophisticated age of science, technology and creativity. Therefore in any reform of education, highest priority should be given to improvement of standards and quality on which depends the future of India.

EPILOGUE

This paper is not a comprehensive treatise on education and India in 21st Century but is intended to serve as an appetizer. That is why the paper has not been structured in usual fashion. The main objective of this paper is to focus the attention of planners, administrators and scholars on certain basic issues and factors which should be kept in mind while planning education to meet the challenges of the 21st century and to emphasise the need for a completely new approach to planning.

Two system diagrams given in the paper show the linkages between education and socio-economic development and some of the important factors which should influence planning of education for the future. Today, human civilization stands on the cross-roads— one gradually leading towards total destruction following the beaten path of confrontation and the other towards forging a global society based on equity, justice, peace and stability which will need a completely new approach to educational development. So far education has followed development, which has led the world to confrontation and violence. If this phenomenon has to be reversed, there is a need for revolutionary changes in the education system to make it an effective and efficient instrument for change. Let India produce a new model for development of education which others may follow. This is a challenge which we should accept. □

[Concluded]

INDIAN INSTITUTE OF PUBLIC ADMINISTRATION

Indraprastha Estate, Ring Road, New Delhi 110002

The Indian Institute of Public Administration which is engaged in teaching, training, research and consultancy, invites applications for the post of a Librarian.

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Or

M.A./M.Sc./M. Com. plus a first or Second Class B. Lib. Sc., or Diploma in Library Science.

(b) At least ten years' experience as Librarian or in a responsible professional capacity in a University Library or other Library of repute.

(c) Ph.D. Degree or equivalent research work in the field relevant to the profession.

PAY SCALE : Rs. 1500-60-1800-100-2,000-125/2-2500 plus allowances as admissible under the rules of the Institute. Benefits of C.G.H.S., Gratuity and Contributory Provident Fund are also available as per rules.

AGE : Preferably not above fifty years. Prescribed qualifications and age limit relaxable on the recommendations of the Selection Committee in case of exceptionally qualified/experienced candidate. Other things being equal, preference will be given to SC/ST/BC.

The post is permanent. Appointment will be on probation for a period of one year which can be extended to two years.

Candidates called for interview will be paid first class rail fare to and fro by the shortest route, subject to production of money receipt or ticket number.

Applications on plain paper giving full particulars of educational qualifications, research work (with publications), details of previous employment, age, present pay, scale of pay, etc., should reach the Registrar, Indian Institute of Public Administration, I.P. Estate, New Delhi 110002 on or before the **2nd May, 1986.** Persons already in employment should route their applications through proper channel.

INDIAN SCIENCE CONGRESS ASSOCIATION

14, Dr. Biresh Guha Street, Calcutta-700017

ANNOUNCEMENT

AWARDS UNDER ISCA YOUNG SCIENTISTS PROGRAMME

Indian Science Congress Association has introduced a programme for the benefit of young scientists since January, 1981. The programme enables young scientists to present their proposed research work during the annual session of the Science Congress with opportunities to exchange ideas in the relevant scientific problems with their counterparts and specialists. For excellent presentations, 20 such scientists are given awards, called ISCA Young Scientists Award.

Only members of the Association are eligible for consideration for the Award. The upper age limit of the candidates for the Award is 30 years as on January 1 of the Session.

The details of the programme are given below :

(1) The papers to be presented for consideration shall have to be :

(a) under single authorship, (b) preference will be given for **independent work preferably at the post-doctoral level,** (c) the work must have carried out in India, and (d) stress will be on both quality of research and performance.

(2) One copy of the full paper alongwith three copies of its abstract in 100 words (to be clearly indicated on the top of the first page of the full paper and on the top of all the three copies of the abstracts the section where it is desired to be presented) shall have to reach the office of the General Secretary (Headquarters) not later than August 16 preceding the session. Biodata, including full name and address alongwith the date of birth (duly supported by attested copy of the certificate), research experience, **list of publications,** should be appended to the complete paper.

(3) The papers/abstracts will be scrutinised and the scientists will be required to present their papers in respective sections, if invited by the Sectional Presidents concerned.

(4) The names of awardees will be announced by the General President at the meeting of the General Body. The Certificate of Merit and the Cash Award of Rs. 500/- will be handed over to the recipients with citations. A further amount of Rs. 2,500/- towards incidentals, etc. will be sent to the awardees later from the Headquarters of the Association as support of the proposed research work.

(5) The young scientists as recommended by the concerned sections will be provided with the admissible travelling and daily allowances by Indian Science Congress Association (maximum of first class train fare by convenient shortest route to and from residence/institute to venue and daily allowance of Rs. 35/- per day for not more than ten days).

Convocation

Dr. Arunachalam Addresses Convocation of Anna University

Excerpts from the Convocation Address delivered by Dr. V. S. Arunachalam, Scientific Adviser, Ministry of Defence, Govt. of India, at the Anna University, Madras, on March 7, 1986.

"...Strictly speaking the Industrial Revolution was an English phenomenon; but the results of this revolution reached the far corners of the world and promised to herald the freedom of man from being a beast of burden. The Industrial Revolution also triggered the growth of towns with chimneys belching smoke and the sprouting of countless mines in the countryside.

The main physical consequence of the Industrial Revolution was the sudden availability of goods and services in such large scale that could never have been conceived of earlier. Man accepted the greater efficiency of these machines with equanimity and in a sense accepted the leadership which these machines bestowed on their owners, in exchange for the benefits of the new products and services that became available.

The social consequences of the Industrial Revolution were also felt immediately. On the one hand, there was a sense of freedom from the oppression which the rural farming community had experienced from ancient times in the hands of the rich, in as much as the cities and industries provided an alternative means of livelihood. On the other hand, it also brought in its wake great economic disparities between the poor and the rich, the old and the young and the woman and the man. Young children worked in factories and mines under intolerable conditions. The social fabric of Europe was being changed fundamentally by the impact of the Industrial Revolution.

It was during this historic moment in human history that the Guindy Engineering College was established. One would normally have expected this new centre of engineering education to become the nucleus for spreading the message of industrialisation at least in this part of the county if not throughout the length and breadth of India. That, however, did not take place, to the great misfortune of many future generations. These new centres of learning and of technical education established in India at that time merely provided the teachers, the surveyors and other assistants that the colonial government demanded. Why did this happen ? How is it that the message of Industrial Revolution coming through teachers and the proponents of this College from England did not evoke a similar response in our country ? This is an important point to ponder for any student of the history of the Industrial Revolution and the growth of technology in our country.

When England was industrialising fast through the benefits of the newly discovered mechanical power, India was losing her traditional technical genius under the imposition of colonial political power. Tales abound of how indigenous tradition and competence in producing useful products and objects of great aesthetic value were wiped out by the ruthless colonial power. Naturally, the colonial masters saw in India an unlimited commercial paradise—as a source of cheap raw-materials and also as a sink where the manufactured products could be traded with great advantage to themselves. An industrial renaissance in India at that time would surely have robbed them of these prized opportunities. They made sure that the colony felt abjectly dependent on the British industries—although, in reality, it was the British economy which survived, parasite fashion, on the availability of raw materials and markets in India.

Thus it was that we missed the Industrial Revolution almost totally. One cannot help wondering how different it would have been for the Indian engineering and technical colleges of that time like the Guindy Engineering College, if this country had participated in greater measure in the Industrial Revolution. Technical education would then have acquired a totally new meaning. Innovation and invention would have come automatically into the Indian technological world rather than remain as distant Gods to be worshipped. That, however, was not to be.

While we are tempted to blame this on our colonial masters, I cannot help feeling that we ourselves and the social structure that we made for ourselves are also to be blamed in no small measure. This period of great industrial renaissance in Europe coincided in time with the unfortunate social and cultural decadence of India. The vibrant teachings of the great thinkers of this country had gone into disuse to be replaced by obscurantism, blind faith and rigidity of social structure. The inflexible values of the caste system of those days imposed an entirely ritualistic interpretation of the work ethics associated with different segments of the society. The thinkers stopped being the centres of new knowledge, the artisans and inventors were reduced to the status of mere beasts of burden. Invaluable skills learned traditionally from generation to generation were not handed down owing to the impact of new fangled social expectations of uncertain value. Enlightened teachings of great Indians on the oneness of mankind were thrown to the winds. Ancient Tamil wisdom had held that there were but two castes of people—the greater people who lived by the principles of justice and gave generously unto others and the lesser class of people who did not.

Such wisdom was no more in currency in India of this time. The rigid caste system and the gross distortions it produced in the interactions between social groups were the greatest inhibitors of creative thinking and innovation. In such an atmosphere, Industrial Revolution had little chance of survival.

With the arrival of independence, we should have apparently got over the two major hurdles that denied us the benefits of Industrial Revolution earlier. These hurdles were colonialism and the stratified social structure that thrived on casteism. It is no coincidence that Mahatma Gandhi who led us in our fight for political freedom also fought with equal vigour against casteism and other social evils; for he knew that in the upliftment of a downtrodden nation, the evils to be fought were as much within as outside. This was also the mission of the great social radical Thiru C. N. Annadurai, after whom this University is named. While the political freedom has been ensured, the removal of the social barriers is taking longer. The doors, however, have been opened in independent India for the benefits of the Industrial Revolution to reach the people however belatedly. Starting with practically no production of steel, chemicals or other industrial products worth mentioning we have tried to catch up in a few decades, with European nations which have taken over a 100 years to reach where they are. We have already moved to a level of industrial capability that puts us among one of the most industrialised nations of the world. The amazing thing is that we take all this for granted and even judge our progress somewhat harshly in comparison with the performance of other developed nations. At times, we are overawed by the progress that others have made and overwhelmed by the rapidity with which the technology was advanced. Perhaps, history will judge us a little more kindly than we do of ourselves today.

Truth to tell, our industrialisation since independence has not been all that successful notwithstanding the spectacular statistics of the tonnages of steel and cement produced or even the impact of the green revolution in making the country self-sufficient infood. There is an agonising non-uniformity or lumpiness in the performance of our scientific and technological sector. One is faced with the curious situation that the nation which can design and orbit a communication satellite payload, lacks the ability to produce an efficient carburettor for its automobiles. Evidently our industrialisation process did not produce the avalanche effect or the chain reaction by which technological innovation becomes a sustained phenomenon, each generation of products and plants helping to improve the quantity and quality of production of the succeeding generation. We have to admit that often our industrial products cannot be compared either in quality or cost with the products in the international market.

Why has this happened ? Why have we not been able to assimilate the fundamentals of industrialisation in our country ? Are we not able to provide the right type of engineers and scientists to absorb technologies and innovate ? Are we destined by an inscrutable fate to remain a rural society incapable of technological innovation ? We know that this is not true. We have a large band of engineers, like many of you, who are as good as any from the best institutions of the industrially advanced countries. May I suggest that the real reason for this obviously inadequate performance must be sought in our attitudes to technology acquistion and utilisation ?

In our eagerness to create production facilities and manufacturing capacities quickly in independent India, we went in for imported technologies for large scale licensed production in numerous areas. While that was inevitable, the management of this process of technology imports created severe handicaps to the emerging technological capabilities within the country. In the technologies that were imported from abroad, there were no questions to be answered and no challenges to be overcome. It was merely operation of instruments and machines—connect to make it work and disconnect to shut off. We did produce thousands of tonnes of steel and fertilizers and hundreds of megawatts of power by these routes. Unfortunately, the process of importing know-how did not generate the know-why. We realise with the wisdom of the hind sight, it is know-why which makes the technology package come alive. We could still have made these foreign technological packages throb with new life in the Indian scene if only we had taken care to absorb them through scientists and engineers working in research labs, design centres and universities rather than dealing with them entirely through production and erection engineers. In this we seem to have lost a great opportunity. No wonder Bhilai led to Rourkela which in turn led to Durgapur to Bokaro to Vishakhapatnam and so on. These technologies never took roots in this country.

Curiously, co-existing in this background of lacklustre performance of the industry in general, we have some shining examples of high technology achievements. I refer to our adventures in atomic energy, in space research and in defence research and development. These do not pertain to the routine areas of general industrial development of the nation; these are mission oriented high technology programmes that demand sophisticated scientific and engineering capabilities. We have been able to design and build nuclear power reactors, satellite launching vehicles, sophisticated radars and sonars. That these achievements have been possible even without the support of an adequate industrial infrastructure in the country, only underscores the point that we can be among the best anywhere in the world technologically speaking, once we commit ourselves to a mission. It will not do to belittle these achievements citing some spectacular developments in USA or elsewhere. How many nations even among the developed world, have these high technological achievements to their credit ? How many have launched a satellite or built a fast breeder nuclear reactor ? These achievements are, in fact, a tribute to the excellent human material which this country is blessed with.

The picture is confusing. Some excellent mission oriented technological achievements stand out against the uninspiring background of a weak indigenous industrial infrastructure that is neither able to innovate on its own nor assimilate external inputs. Unfortunately, the time element is not in our favour. The industrialised world is fast moving on to the second major revolution based on microelectronics and Information Technology. If the first Industrial Revolution replaced muscle power by mechanical power, the present revolution—call it information Revolution, if you like—is beginning to substitute human mental processes by machine processes in several lower order operations. The new revolution is calling upon machines to do many things which are not creative enough to challenge the human brain but are repetitive and large enough to occupy brain time that could otherwise have been employed more creatively. How are we going to learn to utilise these new technologies for the welfare of the people ? How are we going to cope with the intellectual, social and even moral demands of these new technologies ? These are the basic problems facing the technological community in India. These are the problems which you, the new graduates, will have to address yourselves to when you leave the comfortable portals of your University.

You will observe that the two basic issues that face the planners of Science and Technology in India are the following:

(i) How do we make our existing industrial and technological infrastructure efficient and effective in the industrialisation of our nation ?

(ii) How do we use the available and newly emerging science and technology options for solving the economic and social problems that plague the country, many of them chronically ?

These are challenges that have not been faced and solved by many nations in the world. There is hardly any precedent to the social, political and technological dimensions of the Indian problem in this regard. It was the industrial renaissance which preceded social modernisation in most of the Western countries, with the exception of the Soviet Union where the political revolution led to subsequent industrialisation. We are attempting to achieve this technological boot-strapping operation through an evolutionary process—but amidst the tumultuous demands and expectations raised by a politically independent, democratically conscious and ever demanding society.

More often than not, we will find that solutions to our technology problems are available elsewhere in the world. Frequently, transplantations of these technologies by import would appear to offer quick solutions. This temptation must be resisted, for we have paid dearly in the past by opting for such instant remedies. It should be clear to all by now that such technology imports are totally sterile and are incapable of creating the industrial base with the strength to stretch further. There is no alternative to the creation of a sound and modern technology base drawing essentially from our own resources.

Some may ask "who needs modern technology ?" Some contend that the pressing problems facing the hungry and illiterate millions of India do not require modern technologies for their solution ; they need only better programme organisation and management. This, in my view, is entirely erroneous. The fact is that these are precisely the national problems that can be solved efficiently and optimally by the utilisation of modern technologies. In fact, considering the size of the population and the sheer magnitude of the problems, the conventional solutions cannot be expected to make and dent.

Consider, for example, the drinking water problem. The practical solution to the problem of providing safe drinking water in every village calls for water desalination technology, energy efficient and rugged pumps, utilisation of solar energy and development of new materials for the transportation and storage of water. All these require high technology inputs.

Eradication of illiteracy is, perhaps, the most challenging of all the problems that require high technology solutions. In spite of our nation being in the forefront of some advanced technologies, she is still burdened with the world's largest number of illiterates. Illiteracy is a curse that denies the nation the benefits of her rich and brilliant genetic pool that can be employed in scientific, technological and other intellectual pursuits to solve the human problems. Illiteracy also drives the nation into obscurantist, reactionary and unhealthy traditions. The methods that we had adopted so far to spread education among our people, by opening schools in every village, by adult education classes and by "each one teach one" programmes are evidently unequal to the task. The population is too large and the effort too feeble to be of any consequence. We cannot hope to educate all our children and impart knowledge relevant to modern needs by the conventional route. Even attractive features like free mid-day meals for the children have limited utility in the gigantic task of wiping out illiteracy among Indians in a meaningfully short period of time. It is in meeting such major challenges that modern technology comes into its own.

Consider a mass educational programme through television, communications and computers. Consider the possibility of providing, at least, the core educational programmes in every school through an interactive television terminal—a system in which a high quality of instruction can be imparted to everyone, not merely by passive learning techniques but by the active participation of the students through a feedback communication network. Consider again the possibility of providing programmed learning and instruction packages which modern computers can provide. With the utilisation of these modern technologies of television, computers and communication, we can hope to solve many problems of our educational system—shortage of good teachers, irrelevance of the curriculum to national needs, non-uniformity of standards among schools and the inability to expand the infrastructure in quantitative terms. As far as I know, no nation has attempted to link lakhs of remote villages by such an educational network. The very concepts are challenging and the technologies that have to be created for making the system work are invigorating. The challenges are in hardware as well as in software. How do we make the computers, communication and television equipment rugged and reliable to work in the villages ? How do we power them—by fuel cells, photovoltaics or by any other new source ? How do we manage the enormous complexity of the communication channels ? How do we create the educational programmes that convey modern thought in ancient local idiom ? Can these programmes be made to transcend the language barriers by simultaneous multi-lingual presentation? Working as I am in the Defence, I find the challenge of providing a reliable communication network for the Army and integrating it appropriately with similar networks of the Navy and the Air Force, though large and difficult, is not as demanding as the mass education problem I have described earlier. Surely, the solution of the massive national problems of providing the basic and welfare needs of the citizens requires the identification of major societal missions towards which our technology efforts must be oriented.

Quite apart from the technologies needed for these societal programmes, there are also major challenges at the frontiers of technology in our country. There is some misconception—some of which I suspect are deliberately propagated by people outside our country—that high science and technology can only be pursued in the environment of the advanced nations of the West. I deeply regret to say that there are many even amongst our scientists, academics and teachers, who think that one has to go abroad to seek opportunities to work in high technologies. This might have been true some years ago—but emphatically not today. The technology contents of our Space programme, Nuclear Energy programme and the Defence Research programme are challenging enough for the scientists and engineer of any nation.

Take the Light Combat Aircraft programme, for instance. An aircraft of this class is not being built by any nation other than the two super powers and a confederation of European States. We are at the same challenge. We have to introduce several state-of-the-art technologies to make this aircraft light, agile and yet daunting and survivable in combat. Some of these technologies may well have to be invented specific to our LCA. How do we propose to measure upto this technological challenge ?

A soft looking option would be to seek a total foreign collaboration umbrella. In reality, that is not an option at all. It is in these frontier technology areas that the new Imperialism is most evident. We will then be seeking technologies from nations who will consider doing them out in such small measured quantities which they consider relevant to us or harmless enough as not to pose a threat to their own superiority. I submit that this is an entirely unacceptable option. These technology exchanges with other nations are meaningful only if we achieve a *position of strength of our own in* critical technologies. May I point out that even as the barriers of the Indian caste system based on accidents of birth are crumbling, a new and more insidious caste barrier is being erected across the world ? I refer to the caste barrier that divides the developed nations from the developing and undeveloped world. The two sides in this new division are none other than the haves and the have-nots of modern technology. We cannot afford to end up on the wrong side of this division. We must develop our own technologies, limiting acquisitions from abroad to what is unavoidable. The technology market place has respect only for those who demonstrate the determination to be self-reliant.

Unfortunately, often we appear hesitant and ill prepared to undertake such mammoth technology missions. Some developed nations make it a point to encourage this hesitancy on our part. Perhaps, the Indian tendency to hesitate has deep cultural roots in our contemplative mental make-up. The great Arjuna hesitated before the war of righteousness against the Kauravas. We also know that once we overcome the hesitation, we will be victorious. Truly did Thiruvalluvar say :

"Consider well before you dare ;
To falter thereafter is unworthy.

Mahatma Gandhi did not keep looking back to see if it would not have been prudent for him to stay as a barrister in South Africa. Instead, having chosen for himself a mission much larger than the individual destiny, he plunged headlong *into the struggle of emancipating* the millions in India. The result is history. It is clear that we need such a determination to produce a self-reliant, Swadeshi movement in Indian Technology.

How do we bring about this Swadeshi movement in technology ? How do we ensure that our young *graduates, scientists and technologists*, get their rightful share of opportunities for technological adventures ? The nation must set high technology goals for achieving major societal missions—goals that will test the skills, knowledge and commitment of these young adventurers. There are, of course, no Gandhis and Nehrus among the scientists and technologists. Perhaps, there will never be. The very training of these people in disciplines that are universal in character precludes the emergence of such a nationalistic leader from among them. Has *it not* been said that the king has power only in his country; to the learned, however, the entire world is his domain ?

The scientist, however, cannot operate in isolation from his own society. He must contribute to it. In return, the society must make him feel respected for his contributions that can transform life. I am afraid we have not yet found the *right balance in this regard. I do not* know the complete solution to this problem; but we must make every effort to provide the right environment. We must make our universities and other educational opportunities open to all, irrespective of caste and creed. We are keen learners. Some are early blossomers and some are late in growing. Some come from well-off groups and some from the down-trodden segments. Some will be rich, others poor. Education must not discriminate in any way among them and we must ensure this. Let *there be more engineers* rather than less. Let no one deserving be denied an opportunity to be part of the science and technology revolution that will shape our tomorrow. Let us make sure that, in future, we will discover the Ramanujams of our country ourselves and provide them with all the opportunities that their genius deserves..." ❑

New UGC Members

The Government of India has announced the appointment of the following new members of the University Grants Commission:

(1) Prof. Suresh Dalal,
Professor of Gujarati Literature,
University of Bombay,
Bombay

(2) Prof (Mrs) Archana Sharma,
Professor of Botany,
University of Calcutta,
Calcutta

(3) Prof. G. Padmanabhan,
Professor of Bio-Chemistry,
Indian Institute of Science,
Bangalore

(4) Dr. M. Aram,
Vice-Chancellor,
Gandhigram Rural Institute,
Gandhigram

(5) Shri Kireet Joshi,
Special Secretary,
Department of Education,
Ministry of Human Resource
Development, New Delhi.

They will hold office for a term of three years.

JANATA SHIKSHAN PRASARAK MANDAL'S

COLLEGE OF ENGINEERING & POLYTECHNIC

PUSAD-445215 Distt. Yavatmal (M.S.)

VACANCIES AVAILABLE

Applications on plain paper accompanied by complete bio-data with attested copies of certificates, are invited from the qualified persons for the following posts so as to reach the Principal on or before **30th April 1986.**

Department	Number of Vacancies			
	College			Polytechnic
	Prof.	A. Prof.	Lect.	Lect.
Civil. Engineering	1	3	3	—
Applied Mechanics	1	2	3	2
Mechanical Engineering	1	4	4	4
Electrical Engg.	1	2	4	1
Electronics	1	2	4	3
Computer Engg.	—	1	1	—
Mathematics	—	—	1	1
Physics	—	—	1	—
Chemistry	—	—	1	1
Librarian/Asstt. Lib.		(One each)		
P.T.I.		(One)		

I.T.I. Certificate holders in Carpentry, Plumbing, Fitting, Moulding, Electrician and Machine Assistant, Survey instrument repairs, One against each trade are required.

Payscale and qualifications are same as AICTE. B.E. Ist Class for College and IInd Class for Polytechnic can be considered for appointment. Attractive Service conditions are already in force.

Higher start can be considered in case of exceptionally qualified candidates.

The application should be accompanied by a Postal Order of Rs. 10/- payable to the Principal, College of Engg., Pusad.

B.M. Thakare
PRINCIPAL
College of Engg. & Poly.
PUSAD

Dr. N.P. Hirani
PRESIDENT
Janata Shikshan Prasarak Mandal
PUSAD

Chemical Education in India : Challenges of the 21st Century

A National Symposium on Chemical Education in India—*Retrospect and Prospect*: Challenges of the Twentyfirst Century was held in the Department of Chemistry, University of Rajasthan, Jaipur during March 10-14, 1986 under the auspices of the Special Assistance Programme in Chemistry.

The main themes of the symposium were: (i) Impact of the new National Policy on Higher Education on teaching and research in chemistry; (ii) use of new educational technology in chemistry; and (iii) Newer concepts in teaching of Inorganic, Organic, Physical and Analytical Chemistry as well as other specialised areas.

About 40 outstanding participants including 4 chemist Vice-Chancellors, 25 Professors and two representatives from NCERT as well as about 70 local participants participated in the symposium. Status Reports of the research work carried out in the country in the field of Physical, Inorganic and Organic Chemistry showing the areas of weakness and strength were prepared and circulated among the participants.

Recommendations

After a thorough discussion on the present status of teaching and research in Chemistry, the following recommendations were made by the Symposium:

1. CURRICULA

(A) Under-graduate Level

(i) A careful account of the earlier training (strengths and weaknesses) should be kept in mind while prescribing the curricula.

(ii) There was general consensus that more emphasis should be laid in our curricula on principles rather than factual material. However, it was also pointed out that factual knowledge should not be entirely ignored as the same continues to play a role for practising chemists; reference was made to the earlier (1960s') experience in U.S.A. where the neglect of factual knowledge had led to grave misconceptions about many common materials.

(iii) At least in a part of the syllabus, the artificial division of chemistry into the conventional three branches may be minimised; in fact a better coordination of portions of chemistry syllabi overlapping with Physics (e.g. atomic structure; thermodynamics) would be desirable to remove any misconceived notion about too much compartmentalization of scientific knowledge as a whole.

(iv) With a common minimum core-curriculum, the syllabi in individual institutions could have variations in the form of electives according to facilities available and local environment.

(v) There should be increasing exposure to computational technology.

(vi) There should be provision for suitable courses (units) in biology and mathematics for students planning to specialise in chemistry at the post-graduate level and not exposed to these in their regular under-graduate curricula.

(B) Post-graduate Level

(i) The Post-graduate syllabus should have a core-syllabus and the rest may be divided into elective units, e.g., photochemistry and radiation chemistry, nuclear chemistry, organometallics, chemical kinetics, bio-synthesis, polymers, electro-analytical techniques. Such units should also include topics like logic, economics, statistics and management modelling etc. which have been conventionally considered to be out of the domain of chemistry. Considerable flexibility should be available in the choice from these units depending on the expertise available and the final goal of the student.

(ii) There should be provision for tutorials/problem solving sessions in which, in addition to normal kind of problems, interpretation of spectra (using xeroxed copies) may also be carried out. At the final stages of training. It may be desirable to choose some simple problems from the latest research literature as illustrative examples to create confidence and awareness of current literature.

(iii) A small project, mainly to familiarize the students with the technique of literature survey (on a given topic) and research methodology, should be helpful to them (the recent addition of another year at the B.Sc. stage may be helpful in this direction).

2. THEORY TEACHING

(i) Use of audio-visual aids like charts, models, demonstrations, video-casettes and tape-recorded CPU screens should be encouraged.

(ii) The students should be encouraged to ask questions by trying to make learning/teaching, a two-way process.

(iii) Audio as well as audio-visual tapes by inspiring teachers from all over the country as well as abroad should be made available for the benefit of students as well as teachers; the National Open University should play an active role in these directions.

(iv) There should be increasing use of computers.

3. LABORATORY WORK

(i) There should be emphasis on open-ended experiments to illustrate the principles dealt within the theory classes.

(ii) The experiments in conventional analytical 'qualitative as well as quantitative) chemistry could also be utilized for better understanding of basic concepts (e.g., chemical equilibrium, adsorption, etc.) along with development of expertise in analytical chemistry. Efforts should be made to use samples like cement, soil, coins, minerals, honey, drugs etc. rather than only artificially prepared samples for analysis.

(iii) A "culture of instrumentation" should be developed by:

(a) increasing use of instrumental methods of analysis:
(b) development of new types of inexpensive teaching equipments; and
(c) training in basic tools, e.g., glass blowing, electronics; use of microprocessors or/and computers.

(iv) Looking into the increasing cost of chemicals, the choice of less expensive chemicals to illustrate the same basic principles and the technique of semi-micro analysis should be encouraged;

(v) Facilities for training in vacuum techniques should be provided;

(vi) Greater attention should be focussed on safety precautions and devices;

(vii) Laboratory training should be a vehicle for better appreciation and understanding of

(a) spectroscopic methods;
(b) reaction mechanisms;
(c) stereochemistry, etc.

(viii) Attention should be given to interaction of laboratory work with environment, e.g., analysis of water, soil and air, etc.

4. ADMISSION OF STUDENTS

(i) For admission at the post-graduate level, a properly conducted test should be helpful in evaluating the candidates' suitability for the challenging programmes.

(ii) Senior inspiring teachers from universities should visit schools and under-graduate colleges (particularly in less developed areas) to project an exciting image of chemistry to attract better students for chemistry courses.

5. EVALUATION

(i) There should be continuous evaluation in theory as wel as practical work to encourage continuous efforts on the part of students and to provide a feedback to the teachers.

Such evaluation must be on absolutely an OPEN and NON-SECRETIVE basis to ensure their credibility and inspire confidence amongst all concerned (e.g., attention was drawn to a successful practice in these directions at the IIT, Kanpur).

(ii) The conventional examination papers should have lesser choice of questions to minimize the evil of selective studies. A better alternative would be to give internal choices only.

(iii) Both short as well as long questions should be asked in conventional and continuous examinations.

6. Professional Development of Teachers

The following points were suggested for the above purpose:

(i) Orientation programmes for new teachers;

(ii) Periodic refresher courses with mutual evaluation of participants and resource personnel;

(iii) Recognition of good teaching by research grants, awards, advance increments and promotion;

(iv) Frequent seminars/cross-discussions;

(v) Provision of facilities like cyclostyling; preparation of slides; tapes for teachers, etc.;

(vi) Enhanced facilities for participation in national/international conferences and visits to national laboratories.

7. Research

(i) Better instrumental facilities should be provided and arrangements for their maintenance as well as provision of well trained technical personnel to operate these facilities should be made;

(ii) Better library facilities are needed for the research students including a rich library of audio-visual tapes of research seminars by inspiring teachers;

(iii) Arrangement should be made for centralized services in both the above directions.

(iv) There should be more active interactions and cooperation amongst;

(a) different university centres;
(b) universities and laboratories of Government agencies; and
(c) universities and industries.

(v) Ph.D. training should emphasize more on research methodology, innovative thinking and development of the capacity for problem solving.

(vi) Provision should be made and encouragement given for supervision of a Ph.D. candidate by more than one teacher (including teachers from other disciplines).

(vii) Ph.D. candidates should be expected to give a few seminars and preferably submit a minor dissertation on a topic unconnected with the major thesis; in this dissertation a well-argued plan of work on an unsolved problem (extracted from literature) may be presented without any experimental work or theoretical calculations.

(viii) In view of serious difficulties being experienced in recruiting research fellows, the need to have a re-look into the newly introduced policy of the funding agencies permitting selection of **only** candidates qualifying in a National Test was emphasized.

8. Although most of the above recommendations have been presented from time to time, the need to take urgent steps for actual implementation at different levels, e.g., (i) individual teacher; (ii) institutional; (iii) state; and (iv) U.G.C. was strongly emphasized.

9. In addition to the existing agencies, some suggestions, e.g., the role of the new National Open University for assistance in implementation of recommendations has also been made.

10. It is further urged that publication of success stories in individual instances would be a source of encouragement to others and steps should be taken to use the new journal of Chemical Education (U.G.C.) for this purpose.

New courses at Burdwan University

The University Grants Commission has released a sum of about Rs. 35 lakhs to the Burdwan University for introduction of the one-year diploma course in computer applications for post-B.Sc. students from the current academic session. The initial intake to the course would be 30.

Burdwan University also proposes to start course in electronic instrumentation from the current academic session, according to Dr. Shankri Prasad Banerjee who also announced that the U.G.C. had released funds for opening an advanced centre of learning in Bengali Language. The Centre, he said, would strart functioning from July this year.

AP Open Varsity to offer new courses

The Andhra Pradesh Open University proposes to introduce postgraduate diploma courses in Telugu, Journalism and Public Relations. MBA Course is also proposed to be started for inservice candidates. This was announced by the Vice-chancellor of the University, Dr. C. Narayana Reddy who said 10 more study centres would soon be opened in backward areas. There were 9 study centres in Hyderabad and 21 in other districts of Andhra Pradesh.

Sanskrit Vidyapith in West Bengal

The Central Government is reported to have agreed to set up an Eastern Regional Sanskrit Vidyapith in West Bengal. A site on the Eastern Bypass has already been selected. The Vidyapith, when established, would cater to the needs of higher studies and research in Sanskrit.

Postgraduate studies at Sher-e-Kashmir Varsity

Sher-e-Kashmir University of Agricultural Sciences and Technology has introduced M.Sc. degree course in Agriculture. The subjects covered are Plant Breeding and Genetics, Entomology, Plant Pathology, Agronomy and Pomology. The postgraduate programme would be conducted at the Shalimar Campus of the University.

Relief to teachers in Delhi Colleges

The University Grants Commission has decided to grant 'personal pay' to the selection grade teachers in Delhi Colleges who have been stagnating or may stagnate at the maximum of Rs. 1900 p.m. in their pay scales of Rs. 1200-1900 for two years or more. This personal pay would be equivalent to the rate of increment last drawn by the incumbent and is made effective from 1st January, 1986. This will also be taken into account for all purposes as admissible under normal rules.

Practice of Peace

To commemorate the declaration of the Year 1986 as Peace Year by the United Nations, the Peace Research Centre, Gujarat Vidyapith organised a short term evening course on "Practice of Peace" under the guidance of Veteran Gujarati Literateur Shri C.C. Mehta. The course divided in two sessions had a very encouraging response. The first session was held from 28th March to 2nd April, 1986. The other session began on 21st April and will last till 26th April, 1986.

The aim of the course is to understand the mind of an individual as the centre of both peace and conflict. Lectures on Mind, the Causes of Disturbance of Mental Peace, the need to remove them and the ways to remove them were delivered by Shri C.C. Mehta, Mohanbhai Patel, Natwarlal Yajnik, Labhashanker Joshi, Jayendra Yajnik, R.A. Modi and R.N. Mehta.

Public lectures on health care

The Postgraduate Institute of Medical Education and Research, Chandigarh, proposes to organise a series of public lectures on health care. The objective of these lectures is to create an awareness of the preventive and therapeutic aspects of some specific health problems. Topics likely to be taken up are: alcohol and liver, smoking and heart, dieting habits and blood pressure, drug addiction, blindness, etc.

Bharathiar University Hosts AIU Meetings

Bharathiar University hosted the meetings of AIU Standing Committee and other Sub-Committees from 3rd to 6th April, 1986. Prof S.V. Chittibabu, Vice-Chancellor Annamalai University, and the President of Association of Indian Universities presided over these meetings.

The Sub-Committee on the working of **Autonomous Colleges** which met at PSG College of Technology, Coimbatore, was attended among others by Dr. G. Ram Reddy, V.C., Indira Gandhi National Open University and Vice President, AIU, Dr. R. Subbayyan, V.C., Bharathiar University, Prin. K. Bhogishayana, V.C., Shivaji University, Prof. R.G. Takwale, OSD, Maharashtra Govt., Dr. M.L. Mehta, Jt. Secretary, UGC. Quite a number of Principals of Autonomous Colleges of Tamilnadu also attended the meeting.

Papers were presented by Dr. (Miss) E.C.G. Vedanayagam, Professor of Education, University of Madras and Ms. Shanti Manuel, Principal, Lady Doak College, Madurai on the different aspects of teaching in Autonomous Colleges. It was observed that these institutions required special funding which was not available to them for the implementation of their innovative programmes. There was a consensus that effort should be made to persuade the UGC to provide adequate financial assistance to the autonomous colleges so that the good work initiated in different areas is sustained. It was suggested that a Council should be constituted to review the working of these colleges periodically and proper liaison established between UGC, State Governments and autonomous colleges.

The Task Force on **Distance Education** met under the Chairmanship of Dr. G. Ram Reddy, Vice-Chancellor, Indira Gandhi National Open University and recommended measures for the progress of Distance Education in the country.

Prof Reddy outlined the programme of his University and informed the members of the work done in this area in Thailand and England. Dr. K.G. Deshmukh, Vice-Chancellor, Amaravati University, Prof R.G. Takwale, OSD, Maharashtra Govt. and Prof E.I. George, OSD, Kerala Govt., spoke about the work of their Committees and apprised of the progress made by their respective states in establishing open universities.

Dr. V. Rajagopalan, Vice-Chancellor, Tamil Nadu Agricultural University briefed the members about the work being done in his university in the agricultural sector. It was suggested that the Task Force should meet more frequently to provide guidelines on different issues. In-depth studies in certain areas should be undertaken by the AIU for the guidance of states where open universities are likely to be established.

The AIU Sub-Committee on **Mutual Cooperation among Indian Universities** was attended by Dr. S. Krishnaswamy, Vice-Chancellor, Madurai Kamaraj University, Prof. Ramesh Mohan, Vice-Chancellor, Meerut University and Principal Bhogishayana, Vice-Chancellor, Shivaji University. It was agreed that there were many areas where universities could come together and cooperate with each other to their mutual advantage. The AIU could act as a clearing house for effective exchange of teachers and scholars among universities. Books, documents and journals should be freely exchanged among university/College libraries. Though inter-library loan system is in operation in most of the universities there are some institutions which do not permit movement of books and journals. It was felt that liberal exchange of research materials should be encouraged to help research Scholars. Similarly some of the well developed universities could provide technical and laboratory facilities for the training of laboratory technicians of other universities. With regard to the sale of university publications it was suggested that AIU should help publicise various university publications among universities and other agencies. A Sub-Committee under the chairmanship of Prof. Ramesh Mohan, Vice-Chancellor, Meerut University was constituted to make a detailed study of these proposals. It was suggested that representatives of UGC and ICAR may also be associated in this Sub-Committee.

The **Standing Committee** of the Association met on April 6 to consider various administrative matters as also the minutes of other AIU Committees, viz., Sports Committee, Building Committee, Cultural Committee, Equivalence Committee and Research Committee. Presided over by Prof. S.V. Chittibabu, Vice-Chancellor, Annamalai University, the meeting was attended by Prof. Ramesh Mohan, Vice-Chancellor, Meerut University, Dr. S. Krishnaswamy, Vice-Chancellor, Madurai Kamaraj University, Dr. Amreshwar Avasthi, Vice-Chancellor, Rani Durgavati Vishwavidyalaya, Prof. K.S. Shastri, Vice-Chancellor, Gujarat University, Principal K. Bhogishayana, Vice-Chancellor, Shivaji University, Dr. R. Subbayyan, Vice-Chancellor, Bharathiar University, and Dr. Jagdish Narain, Secretary, AIU.

It was noted that a delegation consisting of Prof. P.N. Srivastava, Vice-Chancellor, JNU; Prof. Upendra Baxi, former Vice-Chancellor, South Gujarat University; Shri GBK Hooja, former Vice-Chancellor, Gurukula Kangri Vishwavidyalaya; and Dr. Jagdish Narain, Secretary AIU, had met Shri Venktasubbiah, Chancellor and Governor of Bihar to express Association's concern on mass resignations of the Vice-Chancellors of Bihar Universities in October, 1985. The delegation impressed upon the Chancellor the desirability of withdrawing the ordinance that empowered the Chancellor to remove the Vice-Chancellors at his pleasure. Such a provision is derogatory to the status of the Vice-Chancellors and does not exist in most of the other states.

The Standing Committee noted that the AIU recommendations on Higher Education projecting the Association's views on New Education Policy had been forwarded to the Ministry of Human Resource Development, UGC, Prime Minister's Secretariat and Members of Consultative Committee of MPs on Education. It was reported that the Secretary-General of the Committee of Vice-Chancellors and Principals (CVCP) of U.K. Universities have suggested a meeting with an AIU delegation to discuss bilateral relations concerning administrative organisation, training and maintenance of academic standards in universities. The Committee also noted with satisfaction that AIU organised the Fourth International Conference of University Registrars and Administrators from December 30, 1985 to January 4, 1986 in New Delhi.

Mother Teresa Women's University, Pondicherry University and Goa University, were admitted to AIU as provisional members.

The report of the AIU Visiting Committee in respect of Sri Sathya Sai Institute of Higher Learning, Prasanthinilayam was accepted and it was resolved to grant the full membership of AIU.

In view of the growing importance of the development of Distance Education in the country, it was resolved to organise a seminar on the problems and prospects of Distance Education, at the time of next Annual Meeting of the A.I.U. A note on the proposed **All India University Council** prepared by Prof Upendra Baxi, former Vice-Chancellor, South Gujarat University, and now the Director (Research), Indian Law Institute, New Delhi was considered and it was decided to invite comments from all the members of the Standing Committee before the matter is discussed at the annual general meeting of the Association.

The report on the National Policy on University Libraries was accepted in principle and it was suggested that the document be circulated to the member universities for their comments.

The following priority areas were identified for the research activities of the AIU:

(1) Educational Testing Service
(2) University Governance
(3) Training Programmes for University Administrators
(4) New Cultural Activities in Universities
(5) Relationship of State university organisations with AIU.

The Standing Committee also suggested revision of zonal distribution of universities for purposes of AIU membership, Sports tournaments and cultural meetings.

The Standing Committee reiterated its support to the establishment of an Asian Universities Sports Federation. This will bring University sports talent of Asia on a common platform and provide them the much neeeded opportunities to compete with each other. It was also decided to organise a Seminar on "How to improve University Sports Standards". A survey of the existing infrastructure of sports facilities available in the Universities and Colleges was also desired to be undertaken in the context of the Government of India's decision to augment sports facilities in the Universities and Colleges during the 7th Plan period.

It was decided that the next meeting of the Standing Committee be held at Madurai Kamaraj University in July, 1986. The Standing Committee also accepted the invitation of the Gujarat University to hold the next Annual Meeting of the Association at Ahmedabad in November 1986.

We Congratulate . . .

(1) Prof. R.P. Agarwal, Vice-Chancellor, University of Rajasthan, Jaipur who has been awarded Distinguished Service Award of the Mathematical Association of India for the year 1985.

(2) Dr. M. Aram, Vice-Chancellor, Gandhigram Rural Institute, Gandhigram, who has been appointed Member of the University Grants Commission for a term of three years.

(3) Dr. N.G. Perur who has been appointed Vice-Chancellor of Mahatma Phule Krishi Vidyapith, Rahuri.

Konkan Education Society's Engineering College

PEN-RAIGAD, PIN: 402 107

Applications are invited for the following posts in this College.

Sr. No.	POST			No. of Vacancies
1.	**Professor in :**	(i)	Electronics Engineering	One
		(ii)	Chemical Engineering	One
		(iii)	Civil/Construction Engineering	One
2.	**Assistant Professor in :**	(i)	Electronics Engineering	Two
		(ii)	Chemical Engineering	One
		(iii)	Civil/Construction Engineering	Two
3.	**Lecturers in :**	(i)	Electronics Engineering	One
		(ii)	Chemical Engineering	Two
		(iii)	Civil Engineering	Two
		(iv)	Structural Engineering	One
		(v)	Applied Physics (Material Sci.)	One
		(vi)	Mechanical Engineering	Two
		(vii)	Electrical Engineering	One

Combined Reservation for Backward Class : S.Cs.-4, S.Ts.-3, DT/NTs.-1, O.B.Cs.-2)

Persons applying for post 1 and 2 with the following specialization will be preferred.

Chemical Engineering Deptt. : Thermodynamics of Phase Equilibria, Chemical reaction Engineering, Process Control and instrumentation, Petroleum refining and Petrochemicals, Polymer Technology.

Electronics Deptt. : Digital Electronics, Microprocessor, Power Electronics, Computer Engineering.

Civil Engineering : Structural Engineering, Fluid Mechanics, Construction Management.

Pay Scales and other conditions are same as prescribed by the Govt. of Maharashtra and University of Bombay. If suitable backward class candidates are not available, open category candidates may be considered for appointment on temporary basis.

Applications on plain paper giving full Bio-data, Birth Date, Caste, Educational Qualifications, Experience, Publications, if any, Salaries drawn and expected, etc., supported by attested copies of certificates should be sent to the Principal so as to reach him within 10 (Ten) days from the date of this advertisement.

Persons already in employment should apply through proper channel and send one advance copy directly.

Higher start will be considered in deserving cases.

P.R. Patankar
PRINCIPAL

AIU Library

Established in 1965, the AIU Library has acquired over the years a valuable collection of books and documents on Higher Education. Among the topics prominently represented are Educational Sociology, Educational Planning, Educational Administration, Teaching & Teachers' Training, Examinations, Economics of Education and Country Studies. Developing fields of Adult Education, Continuing Education and Distance Education, and Educational Technology are also well stocked. The Library is particularly strong in its collection of reports whether they are on the setting up of different universities or on the state of Higher Education. Files of Annual Reports of different universities are also maintained. Readers are kept informed of the latest acquisitions through our column 'Additions to AIU Library'.

The Library also receives about a 100 periodical titles on Higher Education. All these are indexed regularly and a select list appears every month as 'Current Documentation in Education'.

Doctoral Degrees awarded during the preceding month are reported as 'Theses of the Month' while registrations made for such degrees are flashed as 'Research in Progress'. Bibliographies are also compiled and supplied on demand.

Research scholars and students of education are welcome to use these resources. The Library is open from 9-30 a.m. to 5-30 p.m. Monday through Friday. Access can also be had through inter library loan for which requisition must be made through your Librarian.

THESES OF THE MONTH

A list of Doctoral Theses Accepted by Indian Universities

BIOLOGICAL SCIENCES

Environmental Sciences

1. Agrawal, Shreesh Chandra. *Investigation on the studies of removal of chromium (Cr + 6) from water by adsorption technique.* APSU, Rewa.

2. Kanth, Tasawoor A. *The longshore transport of sand on Puri and Madras beaches.* JNU, Delhi.

3. Parihar, Rakesh Singh. *Some studies of cement dust pollution in Satna region.* APSU, Rewa.

4. Singh, Virendra Kumar. *Waste water analysis: Studies on hospitals water waste.* APSU, Rewa.

Microbiology

1. Arora, Jatinder. *Studies on the role of blue and green algae in nitrogen fixation in relation to rice crop.* PAU, Ludhiana.

2. Sarbjit Kaur. *Utilization of rice straw for liquid fuel.* PAU, Ludhiana.

3. Dhanni, Renu. *Mutagenic and purification studies on the cellulase complex of Sclerotium rolfsii.* PAU, Ludhiana.

4. Gurmeet Kaur. *Studies on the microbial degradation of chlorinated pesticides.* PAU, Ludhiana.

5. Krishan Kumar. *Solubilization of low grade rock phosphate by Thiobacillus.* HAU, Hissar.

Biophysics

1. Gulati, Neelam. *Study on trace elements in skin tumorigenesis with special reference to selenium (Selenite) using neutron activation and radiotracer techniques.* Pb U, Chandigarh.

2. Sharma, Parduman Kumar. *Physicochemical studies on testicular hyaluronidase after irradiation with accelerated protons and ionising photons.* Pb U, Chandigarh.

Biochemistry

1. Dasgupta, Srabani. *Studies on interrelationship of dietary lipids and vitamin C on cholesterol metabolism in experimental animals.* U Calcutta.

2. Pakala, Raj Babu. *Effect of polyamines and quanidines on membrane bound enzymes in plants.* MSU, Baroda.

3. Phatarphod, Anuradha Dilip. *Galactosyl transferase from cow and buffalo milk.* U Poona.

4. Sarkar, Debiprasad. *Immunogenicity of carbohydrate determinants mediated through liposomes.* U Calcutta.

5. Siddiqui, Abdul Moid Abdul Hameed. *Studies in mixed function oxidase system.* Marathwada U, Aurangabad.

Botany

1. Adhikari, R.S. *Studies on phylloplane mycoflora of three fodder grasses of Pithoragarh region with special reference to its relationship with different environmental factors and nutritional value.* Kum U, Nainital.

2. Jasmeet Kaur. *Studies on cellulase production by some cellulolytic fungi.* Pb U, Chandigarh.

3. Khare, Vinod Kumar. *Growth analytical studies of Allium cepa L. cultivars under variable population densities and nitrogen status of soil.* RDV, Jabalpur.

4. Koul, Pushpa. *Reproductive biology of some economically important umbellifers.* U Jammu.

5. Kurian, Kuruvilla P. *Biology of Madhuca indica (Mahuda).* SPU, Vallabh Vidyanagar.

6. Mohammed Babu, A. *Studies on normal and induced gum/gum resins producing tissue systems in some dicots.* SPU, Vallabh Vidyanagar.

7. Mohan, M. Jagan. *Mutagenic studies in two cultivars of Arachis hypogaea L.* OU, Hyderabad.

8. Mutha Reddy, K. *Aeropalynological and palynological investigation of Hyderabad region, A.P.* OU, Hyderabad.

9. Pandey, Ram Pal. *Production potential of rainfed wheat as influenced by the basal and foliar application of nitrogen.* APSU Rewa.

10. Patel, Rajmani. *Studies on physiology of growth, flowering and fruiting in Carica papaya Linn.* APSU, Rewa.

11. Radha Krishna. *Studies on some myxomycetes of Andhra Pradesh.* OU, Hyderabad.

12. Raj Pal, *Strain selection and development in the cultivated mushroom, Agaricus bisporus*. PAU, Ludhiana.

13. Ramana Rao, Tadapaneni Venkata. *Morphohistogenic studies in the pericarps of some Malvaceae*. SPU, Vallabh Vidyanagar.

14. Reddivenkata Raju, R. *Flora of Kurnool District, Andhra Pradesh, India*. SKU, Anantapur.

15. Satyanarayana Reddy, P. *Floristic study of Warangal and epidermology or Cyperceae as aid to taxonomy*. OU, Hyderabad.

16. Soni, Krishnakant. *Studies on the ecology of litter aecomposing fungi of local forest*. RDV, Jabalpur.

17. Sundararaju, P. *Studies on the burrowing nematode of arecanut*. U Ker, Trivandrum.

18. Thulaseedharan A. *Studies on physico-biochemical parameters of some hybrid varieties of bajra, Pennisetum americanum (L) Leeke*. SPU, Vallabh Vidyanagar.

Zoology

1. Awati, Bapusaheb Tatoba. *Butea monosperma leaf extract induced alterations in rat male reproductive tract*. Shivaji U, Kolhapur.

2. Deshpande, Gauri S. *A study of electrical responses to on-off and Sine-Wave modulated light stimuli in simple and compound eye system of cockroach, Periplaneta americana*. U Poona.

3. Jena, Mayabini. *Toxicity of selected insecticides to rice insect pests in relation to their persistence and residues*. Utkal U, Bhubaneshwar.

4. Karemungikar, Aruna. *Studies on host-parasite relationship of freshwater snails with special reference to vectors of trematode parasites*. OU, Hyderabad.

5. Kauser Begam. *Physiological responses of fresh water protozoans to various toxicants*. OU, Hyderabad.

6. Muraleedharan, V. *Some aspects of the biology of Entomobryid collembola*. U Ker, Trivandrum.

7. Narayana, P. Ramesh. *Some aspects of energetics of thermal adaptation in the fresh water field crab*. SKU, Anantapur.

8. Nayak, Laxmidhar. *Studies on limnological factors of river Mahanadi at Sambalpur*. Sambalpur U.

9. Sethi, Veena D. *Studies on some giant crab spiders of the family Hetaropodidae from India*. U Poona.

10. Singh, Vimla Devi. *Cytochemical studies on the cogenesis in insects*. APSU, Rewa.

11. Sobhana Kumar, K. *Studies on the biology of spinyeel, Mastacembelus Guentheri Day (Pisces: Mastacembelidae)*. U Ker, Trivandrum.

12. Suryakala, G. *Screening of certain plants for hormonal activity against Spodoptera litura F and Dysdercus koennigi F*. OU, Hyderabad.

13. Unnikumar, K.R. *Effect of pesticide toxicity in the central nervous system of rodents*. Saur U, Rajkot.

14. Upadhyaya, Meera. *Studies in the hypothalamo neurohypophysial system in a fresh water teleost fish and the neural control on reproduction*. APSU, Rewa.

15. Wankhede, Hemlata Janardan. *Studies of the cestode parasites of fishes*. Marath U, Aurangabad.

Medical Sciences

1. Arifullan, H. Mohamed. *Study of pharmacology of carboxylic ionospheres*. U Madras.

2. Kodanda Ram, P. *A study of phychosocial factors of delinquency : An examination of typology*. U Bangalore.

3. Madhavi, G. *Choroid plexus and cerebrospinal fluid formation*. U Madras.

4. Misra, Ambika Nandan. *Fabrication, formulation and evaluation of controlled release drug delivery systems of some drugs.* MSU, Baroda.

5. Patnaik, J.M. *The possible modifying influence of some environmental factors on the 7, 12-dimethylbenz(a) anthracene-induced skin tumorigenesis in swiss alibino mice*, JNU, Delhi.

6. Sasidharan, V.K. *Assessment of biochemical and immunological status of patients with oral cancer*. U Ker, Trivandrum.

7. Venkataraman, B.V. *Cholinergic mechanism in starvation and protein deprivation*. U Madras.

8. ijaya, Medepalle. *Immobilization of amyloglucosidase on magnetic iron oxide and other carriers*. Andhra U, Waltair.

9. Viswanathan, S. *Pharmacological investigation on certain bioflavonoids*. U Madras.

Agriculture

1. Baljit, *Cytogenetical investigations in pearl millet with particular emphasis on male sterility mutants*. PAU, Ludhiana.

2. Brijender Mohan. *Study of components of genetic variability in desi cotton, Gossypium arboreum* L. PAU, Ludhiana.

3. Deedar Singh. *Mutual relationship between iron and manganese in wheat*. PAU, Ludhiana.

4. Duhan, Jagdish Chander. *Alternaria pod and leaf blight of cauliflower, Brassica oleracea var. botrytis raised for seed production and its control*. HAU, Hissar.

5. Grewal, Charanjit Kuar. *Studies on the virus-vector relationship of soyabean yellow mosaic virus and its vector Bemisia tabaci Gennadius*. Pb U, Chandigarh.

6. Harkanwal Singh. *Effect of green manures on soil P transformation and its availability to plants*. PAU, Ludhiana.

7. Lawrence, Ajai Kumar Alison. *Effect of selected parameters on the performance of chaff cutter type threshing system*. PAU, Ludhiana.

8. Irvinder Singh. *Studies on biogas as an alternate fuel in diesel engines used in agriculture sector*. RAU, Ludhiana.

9. Khajuria, Mulk Raj. *Genetic analysis and interrelationships among different traits of inter-varietal crosses in wheat, Triticum aestivum L.* HP Krishi, Palampur.

10. Longia, Nazar Singh. *Studies on sowing dates, planting techniques and irrigation schedules in sugarbeet*. PAU, Ludhiana.

11. Madan, Yashinder Pal. *Bionomics, effectiveness and mass multiplication of Epidyrops melanoleuca Fletcher as ectoparasitoid on Byrilla perpusilla Walker*. PAU, Ludhiana.

12. Mohmad Yussouf. *Seed setting studies in Kale, Brassica oleracea var acephala* DC. HP Krishi, Palampur.

13. Nade, Ulhas Uddavrao. *Studies on irrigation requirements in Kagzi Lime, Citrus aurantifolia Swingle*. Marath U.

14. Nirmal Singh. *Availability of manganese from different manganese carriers to wheat*. PAU, Ludhiana.

15. Palande, Rabhaji Shankar. *Socio-economic impact of integrated rural development programme in Shrirampur Taluka of Ahmednagar District*. MP Krishi, Rahuri.

16. Paramjit Singh. *Winter maize performance under various sowing dates, plant populations, seeding techniques and nitrogen rates*. Pb U, Chandigarh.

17. Pawar, Hindurao Kondiba. *Studies on the effects of application of NPK through FYM and fertilizers and time of harvesting on growth, yield and quality of ginger, Zingiber officinale Rosc*. MP Krishi, Rahuri.

18. Raj Kumar. *Studies on crop geometry, irrigation and weed control in groundnut, Arachis hypogaea L*. HAU, Hissar.

19. Rajan, S. *Selection efficiency and genetic and biochemical basis of resistance to bacterial wild in tomato*. Ker Agrl, Trichur.

20. Saini, Swaran Singh. *Effect of irrigation, nitrogen and crop geometry on growth, yjeld and quality of celery*. PAU, Ludhiana.

21. Sarma, Prafulla Chandra. *Cytogenetical and morphological studies on some triploid tea, Camellia sinensis produced from tetraploid-triploid crosses*. Gauhati U.

Veterinary Science

1. Bidarkar, Dilipkumar Kishan Rao. *Effect of two management regimes on reproductive and physiological status of buffalo heifers in summer*. HAU, Hissar.

2. Choudhary, Sudhir Kumar. *Studies on disposition of trimethoprim-sulphamethoxazole combination following intrauterine administration during different phases of oestrous cycles and metritis in buffaloes*. HAU, Hissar.

3. Jain, Salil. *Hormonal, biochemical and immunological studies on conception failure in buffaloes*. HAU, Hissar.

4. Mallick, Kameshwar Prasad. *Studies on some aspects of immunization by infection and treatment method in neonatal calves against bovine tropical theileriosis*. HAU, Hissar.

5. Mohammed, M.S. Dwan Muthu. *Studies on contrast radiography of urinary tract in equines*. HAU, Hissar.

6. Shukla, Pramod Chandra. *Evaluation of lymphoblastoid cell cultures infected with Theileria annulata for immunisation against bovine tropical theileriosis*. HAU, Hissar.

7. Sinha, Santosh Kumar. *Studies on certain physiologic performances and milk utilization following induction of lactation in infertile cows*. Birsa Agrl, Ranchi.

CURRENT DOCUMENTATION IN EDUCATION

A list of select articles culled from periodicals received in AIU Library during March, 1986

EDUCATIONAL PHILOSOPHY

Khoi, Le Thanh. Towards a general theory of education. *Comp Edn Rev*, 30(1), 1986, 12-29.

EDUCATIONAL PSYCHOLOGY

Bhasin, M.P. The teacher : As behaviourist and perceptualist. *J Indian Edn* 10(6), 1985, 48-54.

Chandler, Louis, A. and Shermis, Mark D. Assessing behavioral responses to stress. *Ednl Psy Measurement* 45(4), 1985, 825-44.

Nelson, Karen H. Challenge and support for student growth. *New Directions Teaching and Learning* (21), 1985, 87-94.

EDUCATIONAL SOCIOLOGY

Agarwal, Vinod B and Winkler, Donald R. Migration of foreign students to the United States. *J Hr Edn (Ohio)*, 56(5), 1985, 509-22.

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RAYAT SHIKSHAN SANSTHA

SATARA (MAHARASHTRA)

Applications in prescribed forms are invited for the posts of lecturers in subjects in the faculties of Arts, Science and Commerce, in the Colleges conducted by the Rayat Shikshan Sanstha and affiliated to Shivaji University and Poona University. The applications should reach the undersigned on or before **20th of May 1986.**

Pay Scales : As per University rules.

Minimum Qualifications : (1) Consistently good academic record with at least second class (C in the seven point scale) Master's degree in relevant subject from an Indian University or equivalent degree from a foreign University.

AND

(2) M. Phil degree or recognised degree beyond the Master's level or published work indicating the capacity of a candidate for independent research work.

50% of the posts available, are reserved for candidates belonging to S.C., S.T., N.T., D.N.T.

For full details and forms of applications please apply by sending a self-addressed envelope of 25 cms x 10 cms size and a crossed postal order of Rs. 10/- drawn in favour of Secretary, Rayat Shikshan Sanstha, Satara.

Secretary
Rayat Shikshan Sanstha, Satara
(Maharashtra)

ALIGARH MUSLIM UNIVERSITY

ANNUAL CONVOCATION 1985

The Annual Convocation of the University for the year 1985 will be held on 29th April, 1986 at 9 A.M. in the University Stadium near Engineering College.

His Excellency Giani Zail Singh, the President of India, has very kindly consented to deliver the Convocation address.

The students who have qualified for the award of Bachelors, Masters or Doctors degrees of the University in 1985 in the faculties of Theology, Arts, Commerce, Social Sciences, Science, Engineering, Medicine and Law; and who wish to attend the Convocation and receive the degrees and medals in person, are requested to intimate the same to the undersigned before the 25th April, 1986 giving the details of their degrees and halls of residence to which they belong/belonged.

All such students may report to the concerned Provosts and collect their Degree Cards on or before 28th April, 1986. They will be supplied with the Gowns from the Office of the Dean of the concerned Faculty on production of the Degree Cards and payment of the hire charges.

N. Moideen
CONTROLLER OF EXAMS. & ADMISSIONS

TECHNICAL TEACHERS' TRAINING INSTITUTE

SECTOR 26, CHANDIGARH

Advertisement No. 8/86

Applications are invited by the Principal in the prescribed form for the undermentioned posts :

1. **ASSISTANT PROFESSORS (Rs. 1200-1900)**
    - (i) Electrical Engineering—(One)
    - (ii) Computer Science—(One)
    - (iii) Electronics and Communication Engg.—(One)
    - (iv) Curriculum Development Centre—(One)
    - (v) Mechanical Engineering—(One) (Short term vacancy)
2. **LECTURERS (Rs. 700-1600)**
    - (i) Electrical Engineering—(Two)
    - (ii) Computer Science—(One)
    - (iii) Electronics and Communication Engg.—(One)
    - (iv) Curriculum Development Centre —(One)
    - (v) Mechanical Engineering—(One)
    - (vi) Rural Development—(One)
3. Producer (Rs. 700-1300)—(Two)
4. Electronics Engineer (Rs. 700-1300)—(One)

Qualifications and Experience

(1) Assistant Professors : Doctorate degree/Ist Class Master's degree in the relevant field with 5-10 years experience.

(2) Lecturers : Ist Class Master's degree in the relevant field. Qualifications are relaxable to Ist Class Bachelor's degree in Engineering.

(3) Producer : A degree in Science/Arts/Engineering or degree/diploma in Direction or Production of Film/TV with 3 years experience in Film/TV Production or Diploma in Engineering with 6 years experience in the line.

(4) Electronics Engineer : A degree in Electronics and Communication Engineering or equivalent with three years relevant experience or diploma in Electronics & Communication Engineering with seven years experience.

General note for all posts regarding relaxation of qualifications/experience

Qualifications in lieu of longer experience and experience in lieu of higher qualifications may be relaxed by the competent authority in case suitable candidates with prescribed qualifications and experience are not available.

The total emoluments at the minimum of the scale including HRA will be approx. Rs. 2950/- for posts at S. No. 1 and Rs. 1978/- for posts at Sr. Nos. 2, 3, and 4.

All posts carry allowances as applicable to Central Government employees stationed at Chandigarh. In addition LTC, GPF-cum-Pension/CPF, Medical reimbursement and leave are admissible as per rules. Higher start of pay is permissible for deserving candidates. In case candidates are not found suitable for higher posts, they can be offered lower posts, if willing to accept. 2nd class to and fro Railway fare is admissible for attending the interviews.

The upper age limit is 35 years for posts carrying pay scale of Rs. 700-1600/700-1300 and is 38 years for posts carrying pay scale of Rs. 1200-1900.

Application forms and detailed information regarding qualifications, experience, and job descriptions etc. can be had from the **Senior Administrative Officer** of the Institute on requisition by sending a self addressed unstamped envelope indicating the name of the post at the top (28cm x 12cm). Applications complete in all respects should reach the Institute on or before **30th May, 1986.**

ANNAMALAI UNIVERSITY

Annamalainagar

Admission Notification No. K2/3/85

Applications are invited for admission to the following courses for the year 1986.

1. CERTIFICATE COURSE IN COBOL PROGRAMMING AND DATA PROCESSING — (Part-time evening course — July to November 1986).
2. CERTIFICATE COURSE IN BASIC PROGRAMMING AND APPLICATIONS (Part-time evening course — July to November 1986).
3. ONE MONTH INTENSIVE COURSE IN COBOL PROGRAMMING AND DATA PROCESSING — (June 1986).

The application form and prospectus can be obtained from the REGISTRAR, ANNAMALAI UNIVERSITY, ANNAMALAINAGAR - 608 002 on payment of Rs. 10/- by a Demand Draft drawn in favour of the "REGISTRAR, ANNAMALAI UNIVERSITY" payable on Indian Bank/Bank of Madura at ANNAMALAINAGAR BRANCH/CHIDAMBARAM BRANCH with a self addressed envelope of size 5" x 11" and stamped to the value of Rs. 1.30 and with a requisition stating the course for which the application is required.

The last date for the receipt of filled in applications by the University is **21-5-1986**.

R. Rajamanickam
REGISTRAR

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING

SHEGAON 444203

(Affiliated to University of Amravati)

1986-87

The College was established in 1983, imparts Technical Education leading to Four-year Degree course of B.E. in the following specialised Branches :-

(1) Electronics
(2) Industrial Electronic,
(3) Electrical Power Sys.
(4) Computer Engineering

The intake for each course for each branch is 66. Candidates having passed Higher Secondary Examination (Std. XII 10+2) and having min. 50% marks in Physics, Chemistry, Mathematics (45% for B.C. candidates) or its equivalent from Maharashtra State are eligible to study. The students from outer states can also be admitted under Management quota. Approach us for admission in the month of May-June, 1986.

The College maintains high academic standards, well qualified staff, up-to-date laboratories, library and hostel facility.

S.S. Patil
CHAIRMAN

V.Y. Mudliar
SECRETARY

Dr. D.G. Wakde
PRINCIPAL

SCHOOL OF PLANNING AND ARCHITECTURE

(DEEMED TO BE A UNIVERSITY)
4 Block-B, Indraprastha Estate, New Delhi-110002.

Applications for Admission to Academic Programmes for the Session 1986-87 are Invited

A. MASTER'S PROGRAMMES (3-Semesters) IN :

I. **Planning** (Open to Architects/Engineers/Social Scientists) with specialisation in urban and regional planning, transport planning and housing.

II. **Building Engineering and Management** (Open to Engineers/Architects).

III. **Architecture** (Open to Architects) with specialisation in urban design and architectural conservation; and

IV. **Landscape Architecture** (Open to Architects/ Landscape Architects/Town and Country Planners)

B. **Pre-Landscape Architecture** (2-Semesters) with scholarship of Rs. 600/- per month.

This is a preparatory Course which enables admission to the Master's Programme in Landscape Architecture, to candidates having Master's qualification in Agriculture/Horticulture/Forestry/ Botany/Ecology/Geology/Geography.

ELIGIBILITY

With Scholarship of Rs. 1000/- per month for Master's Programme.

(a) Candidates having Architecture/Engineering background must have valid GATE SCORE.

(b) Candidates having Social Science background must have the minimum prescribed qualifications and merit in the Admission Test conducted by the School.

N.B. : Subject to availability of seats, candidates with Architecture/Engineering background, who have not qualified through GATE may be admitted to Master's programmes, subject to their possessing the prescribed qualifications and merit in the Admission Test conducted by the School, but they will not be eligible for any scholarship.

Candidates, who are awaiting the results of the qualifying examination are also eligible, provided they complete the admission requirements by 28th July, 1986.

Reservation of Seats

Five percent of the sanctioned intake is reserved for SC/ST candidates. Seats are also reserved for candidates sponsored by the Central/State Governments, Statutory Organisations as well as Institutions.

IMPORTANT DATES

1. **Issue of Forms commences : 7.5.1986**
2. **Last date for issue of Application Forms against payment of Rs. 30/- in Cash/Demand Draft in favour of School of Planning and Architecture**
   - **(a) At School's Counter : 10.6.1986**
   - **(b) By Post : 6.6.1986**
3. **Last date for receipt of Application Forms : 16.6.1986**

REGISTRAR
MMG

Institute of Gandhian Thought and Peace Studies

Gandhi Bhawan, University of Allahabad

SILVER JUBILEE CELEBRATIONS

To celebrate the Silver Jubilee of Gandhi Bhawan which happily coincides with the centenary of the University of Allahabad and U.N. declaration of 1986 as the year of Peace, a number of programmes are being organised. Besides organising exhibitions on Khadi and Village Industries products and Postage Stamps, Paintings, Photographs, Cartoons, Letters, Books and Literature on Gandhiji, an International Seminar on the theme — Gandhiji and Contemporary Ideologies Regarding Freedom, Equality and Peace, will be held from October 5 to October 7, 1986.

It is proposed to charge a token delegates fee of Rs. 100/- from participants, on the occasion of this International meet.

Accommodation and meals will be free of cost to participants whose papers are accepted for presentation. Please send your paper alongwith two copies of abstract by **30th May, 1986.**

Contact Persons :

J.S. MATHUR
Director

O.N. SRIVASTAVA
Associate Director

CLASSIFIED ADVERTISEMENTS

GURU NANAK DEV UNIVERSITY
AMRITSAR
Advertisement No. 3/86

Applications are invited for the following posts on prescribed form obtainable at a price of Rs. 2/- from the office of the Registrar by making written request accompanied by self-addressed stamped envelope of 23 x 10 cms so as to reach this office by 15.5.86 alongwith Crossed Indian Postal Order(s) of Rs. 10/- for the posts at Sr. No. 1 to 10 and 13 to 15 and Rs. 5/- for other posts (non-refundable) drawn in favour of the Registrar, Guru Nanak Dev University, Amritsar.

Persons already in employment must send their applications through their employers. Candidates from within India may not be considered in absentia. Higher start in the grade may be given depending upon qualifications and experience.

The qualifications for the posts of Professor, Readers and Lecturers are as prescribed by the University Grants Commission.

Professor (Grade : Rs. 1500-60-1800-100-2000-125/2-2500)

1. Business & Commerce-1

Readers (Grade : Rs. 1200-50-1300-60-1900)

2. Mathematics-1
3. Electronics Technology-2
4. English (Regional Centre, Jalandhar)-1

Lecturers (Grade : Rs. 700-40-1100-50-1600)

5. Physics-1 (Temporary but likely to continue)
6. Pb. School of Economics-1
7. Electronics Technology-2
8. English (Regional Centre, Jalandhar)-1

Archival Cell

9. Archivist-1 (Rs. 1200-1900)
10. Assistant Archivist-1 (Rs. 700-1600)
11. Micro Photographist-1 (Rs. 425-700)
12. Conservationist-1 (Rs. 425-700)
13. Assistant Director Physical Education-1 (Rs. 700-1600) for University Campus.

Research Fellow

(a) **University** (Rs. 800/- p.m. fixed)

14. Electronics Technology-2

(b) **Projects** (Rs. 1000/- p.m. fixed)

15. UGC Scheme-1 "Free radicals lipid peroxidation and anti oxidants in ageing of feeding and non-feeding insects"

University Press

16. Foreman-1 (Rs. 680-1120)

Physics Department

17. Junior Technical Assistant-II-One (Grade : Rs. 600-1120)

Qualifications/Specialisations

For the post at Sr. No. 1
1. M.Com/M.B.A.
2. Ph. D. in any of the following three areas :—
   (a) Marketing
   (b) Personnel and Industrial Management
   (c) Accounting and Finance.

Sr. No. 2 In the thrust areas operations Research and Computer Mathematics.

Sr. No. 3 **Essential :**

(i) Ph.D. Degree in Electronics and Communication Engg./Electrical Engg. with minimum experience of 3 years in teaching and/or research in a University and/or institute of repute.

OR

First Class Master's Degree in Electronics and Communication Engg./Electrical Engg. with minimum 5 years experience in teaching and/or Research in a University and/or Institute of repute.

(ii) Specialised knowledge in Instrumentation/Computer Technology/Communication Engg./Control systems.

Sr. No. 5 Theoretical physics, Radiation physics.

Sr. No. 6 (i) M.Sc./M.A. in Mathematics/Statistics with high second division.

(ii) **Specialisation** : Econometrics and Computer Applications in Economics.

Sr. No. 7 **Essential :**

Master's degree in Electronics and Communication Engineering/Electrical Engineering with specialisation in Instrumental/Computer Technology/Control System/Communication Engg.

In case suitable candidates with Master's degree are not available or found un-suitable, first class B.Tech/B.E. in Electronics & Communication Engineering/Elec. Engg. will be considered. However, they will have to obtain Master's degree in the relevant field within five years.

Sr. No. 9 : **Essential**

(i) At least 2nd class Master's degree in History with an optional paper in Indian History of Post-1600 period of recognised University.

(ii) Knowledge of Archival Science and 5 years experience of Research in Modern Indian History/teaching of Modern Indian History to University Classes/work in a supervisory capacity in a Archival Office.

(iii) Experience of editing historical documents.

Sr. No. 10 (i) 2nd class Master degree in Modern Indian History of a recognised University or equivalent.

(ii) About 2 years experience of Research or teaching in Modern History to University Classes or about 2 years experience of work in a Government records Office.

Sr. No. 11 B.Sc. in physics with practical experience in photography.

Sr. No. 12 B.Sc. in Chemistry and physics.

Sr. No. 13 (i) At least second class Master's degree in physical Education, second class Bachelor's degree/diploma in Physical Education.

(ii) At least five years' experience in organising Physical Education and/or coaching programmes in a University or College.

(iii) Specialization in athletics and/or one major game with a reasonable degree or efficiency in training and coaching major games. Representation at the national level in at least one game.

(iv) Knowledge of Punjabi upto Matric standard.

Note : Conditions No. (ii) to (iv) can be relaxed in deserving cases.

Sr. No. 14 B.E./B.Tech. degree in Electronics/Electrical Engineering with at least 60% marks.

The Research Fellows shall be required to assist the research and teaching activities of the department as well as to do M. Tech. as part time student.

Sr. No. 15 Only the candidates who fulfil the conditions of having passed the National Education Test conducted by the U.G.C. and desirous of doing Ph.D. need apply.

Sr. No. 16 Matric; Three years Diploma Course in Printing Tech. from a recognised Institute, five years experience in a reputed press as Supervisor.

OR

Matric with eight yearsx-e perience as Section Holder/Assistant Foreman in a Govt. Press.

Sr. No. 17 Matric 2nd division with diploma in Optical Instrumentation/Scanning and 5 years experience.

The number of posts can be changed at the discretion of the University.

The candidates belonging to Scheduled Castes/Backward classes of Panjab State when called for interview will be paid travelling allowances according to University rules.

REGISTRAR

AGRA UNIVERSITY
AGRA

Dated : 5.4.1986

Applications on the prescribed form obtainable from the Assistant Registrar (P&T), Agra University, Agra on a payment of Rs. 10/- at the counter and Rs. 15/- by money order, are invited for the following posts. Application complete in all respects should reach the undersigned latest by **May 26, 1986**, after which no application shall be entertained. Following are the grades for the different posts, D.A. and other facilities are as per University rules. Qualifications for the posts 1 to 8 are as per the Statutes of the University, a copy of which shall be supplied with application form alongwith the specialization required for *these posts. Desirable qualifications for the posts 9 to 11 and job requirements for* them shall also be supplied with the application form.

Professor—Rs. 1500-2500.
Reader —Rs. 1200-1900,
Lecturer —Rs. 700-1600.
Sr. Tech.—Rs. 570-1100.
Assistant.

1. Professor—One—Sociology.
2. Professor—One—Economics.
3. Reader —One—Sociology.
4. Reader —One—Social Work.
5. Reader —One—Statistics.
6. Lecturer —One—Statistics.
7. Lecturer —Two—Social Work.
8. Lecturer—One—Economics.
9. Reader —One—Computer Application

Essential : (i) Master's Degree in Computer Science or Computer Application with at least three years experience of writing programmes in Scientific or business language through teaching or consultancy work.

OR

Master's Degree in Physics or Mathematics or Statistics with experience of at least six years of writing programmes in Scientific or business language through teaching or consultancy work.

OR

Master's Degree in Physics or Mathematics or Statistics, and one year post M.Sc. Diploma in Computer Science, with at least five years experience of writing programmes in Scientific or business language through teaching or consultancy work.

(ii) At least three years experience of teaching COBOL or BASIC or FORTRAN as Lecturer in a University, or in an equivalent position.

10. Lecturer—Two—Computer Application.

Essential

Master's Degree in Computer Science or Computer Application.

OR

B.E./B.Tech./M.Sc. (Physics or Mathematics or Statistics) with at least two years experience of writing programmes in scientific or business language through teaching or consultancy work.

OR

M.Sc. (Physics or Mathematics or Statistics) and one year Post-M.Sc. Diploma in Computer Science, with at least one year experience of writing programmes in scientific or business language through teaching or consultancy work.

11. Senior Technical Assistant—Two

Essential

Intermediate Science, with experience of working as console operator and of operating air-conditioning equipment.

S.B.B.B. Singh
REGISTRAR

BANASTHALI VIDYAPITH

[Member: Association of Indian Universities
Association of Common-Wealth Universities]

(GOLDEN JUBILEE 1935-85)

Banasthali Vidyapith, the National institution for women's education, has been doing poineering work in its field over last half a Century. Its attempt is to bring about an all round development of students personality expressing a synthesis of the spiritual heritage and scientific achievement of the East and the West. The Vidyapith lays great stress on value inculcation and character building and emphasis on Indian Culture, thought and conduct and balance between individual freedom and social responsibility characterise Vidyapith's ethos.

The Vidyapith invites applications for the following positions :

Department of English : Professor 1, Reader 1, Lecturer 1.

Department of Home Science : Professor 1 (Child Development/Food and Nutrition), Reader 1 (Food & Nutrition/Child Development), Lecturer 6 (Food & Nutrition 1, Biochemistry 1, Food Technology 1, Home Management 1, Clothing & Textile 1, Extension 1).

Department of Music : Professor 1 (Vocal/Instrumental-Hindustani), Lecturer 3 (Vocal / Sitar-Hindustani / Musicology).

Department of Drawing and Painting ; Professor 1, Reader 1 (Specialization Preferred-Aesthetics).

Department of Education : Professor 1, Lecturers 2 (Specialization subject Home Science/Sanskrit/English/Music).

Department of History : Lecturer 1 (*Modern India*).

Department of Sanskrit & Vedic Studies : Professor 1 (Sanskrit), Lecturers 3 (Vedic Studies—Sahityacharya/Vyakaranacharya/Vedacharya (Yajurveda).

Department of Sociology : Professor 1, Lecturer 1.

Department of Political Science : Professor 1, Lecturer 1 (International Politics).

Department of Textile Designing : Reader 1 (*Weaving/Printing*), *Studio* Assistant 1 (Weaving).

Department of Chemistry : Lecturers 2 (Analytical 1, Inorganic 1).

Department of Mathematics and Statistics : Lecturer 1 (*Statistics*).

Department of German : Lecturer 1.
Department of Zoology : Lecturer 1.
Department of Physical Education : Lecturer 1.

Department of Computer Science : Reader 1, Lecturer 1, Programmer 2.

Department of Physics : Lecturer 1.

Department of Electronics : Lecturer 1.

Department of Hindi : Lecturer 1.

Qualifications : As prescribed by the University Grants Commission. Qualifications for Computer Science. Textile Designing and Vedic Studies will be supplied on request.

Pay Scales : (With appoximate initial emoluments in brackets) :

Professor : 1500-60-1800-100-2000-125/2-2500 (2910/-)
Reader : 1200-50-1300-60-1900 (2610/-)
Lecturer : 700-40-1100-50-1600 (1854/-)
Programmer : 700-40-900-40-1100-50-1300 (1854/-)
Studio Assistant : 820-20-900-25-1000-30-1300-40-1500-50-1550 (Government Grade). (1420/-)

Dearness Allowance at Rajasthan Government rates. Provident Fund, Gratuity-cum-Insurance, Group Insurance benefits on *confirmation*.

Notes : 1. Teachers must become habitual wearer of Khadi on appointment.

2. Vidyapith reserves the right not to fill any post advertised or to increase or decrease the number of vacancies.

3. Selection Committee may recommend higher start, higher grade in exceptional cases on merit.

4. First Class return fare for the post of Professor and Second Class fare for others will be paid to persons appearing for interview.

Application on prescribed forms in seven copies must reach the Secretary, Banasthali Vidyapith, P.O. Banasthali Vidyapith (Rajasthan) 304022 by **15th May, 1986.** Forms can be obtained by sending Postal Order of Rs. 10/-.

STRUCTURAL ENGINEERING RESEARCH CENTRE

GHAZIABAD (U.P.)

(Council of Scientific & Industrial Research)

Advertisement No. 2/86

Applications are invited from Indian Nationals for the following post in the Structural Engineering Research Centre, Ghaziabad which is a forward looking organisation well equipped for advanced research in Structural Engineering:

Scientist Grade 'E-I'

3 Posts (Rs.1500-60-1800-100-2000).

Qualification & Experience

1st Class B.E. (Civil) with 12 years experience OR M. Tech./M.E. or Ph.D. in Structural Engineering with original work as evidenced by patents or publications; Evidence of leadership with about 10 years of R & D experience in the area related to the job requirement.

Job description

For Post (i) — The selected candidate would be required to organise, direct and conduct research in the field of computer aided design of complex structures especially, high rise buildings and large span and underground structures.

For Post (ii) — The selected candidate would be required to organise direct and conduct research in the field of high rise buildings e.g. development of techniques of theoretical and experimental analysis and design of tall buildings. He would also work on selected problems like soil structure interaction, monitoring performance of structures in service, mathematical modelling etc.

For Post (iii) — The selected candidate would be required to organise, direct and conduct research on dynamic behaviour of structures like high rise buildings and large span structures. He would also be required to organise and conduct field experiments to study behaviour of structures in service.

2. Scientist Grade 'C'

2 Posts (Rs. 1100-50-1600)

Qualifications and Experience

Essential : A first class degree in Civil Engineering with 6 years experience or M.E. with 4 years experience or Ph.D. (Engineering) with 2 years experience.

Desirable : Published papers of high quality in the fields of large span structures, High rise buildings, computer aided design of complex structures and numerical techniques for structural analysis.

Job requirements : The Scientist would be required to work in the fields of large span structures and integrated analysis and design of structures—computer aided design.

3. Scientist Grade 'B'

8 Posts (Rs. 700-40-900-EB-40-1100-50-1300).

Qualifications and Experience

Essential : A first class Bachelor's Degree in Civil Engineering or a first class Master's Degree/Diploma in Computer Science (software) from a recognised University.

Desirable : Knowledge of computer aided analysis and design of structures. Some research experience.

Job Description : Selected candidates would be required to work on R&D Programmes in high rise buildings, long span structures, tunnelling and under ground structure and development of computer software for Civil Engineering Structures.

4. Information Officer 'B'

1 Post (Rs. 700-40-900-EB-40-1100-50-1300).

Qualifications and Experience

Essential : B.Sc. (Sc.)/Dip. in Engg./Tech. of 3 years duration or equivalent with 8 to 10 years relevant experience OR M.Sc./M.E./B. Tech. or equivalent with 4 to 6 years relevant experience.

Desirable : Must have a flair for writing and drafting in English and Hindi. Knowledge of use of Word Processing equipment.

Job Description

The selected candidate would be required to handle technical querries independently. He would also be required to keep the profession informed of the research activities of the Centre, prepare and edit annual reports and other publicity material. He would also be required to handle jobs on word processing equipment.

5. Maintenance Engineer (Civil)

1 Post (Rs. 700-40-900-EB-40-1100-50-1300).

Minimum Qualifications : 3 years Diploma in Civil Engineering or equivalent with 8-10 years experience or B.E./B. Tech. with 4-6 years experience.

Job Requirements : Planning and supervision of Civil works of Laboratory buildings as well as residential quarters, their maintenance, installation of services, such as, water supply, drainage other sanitary services, electrification (including external electrification), air-conditioning, substations and lifts, and recording of measurements and scrutiny of relevant bills.

6. Junior Engineer (Electrical)

1 Post (Rs. 425-15-500-EB-15-560-20-700).

Minimum Qualifications : 3 years Diploma in Electrical Engineering or equivalent. Some relevant experience would be desirable.

Job Requirements

Planning, supervision and maintenance of electrical and airconditioning services for laboratory buildings and residential quarters including external electrification works, lifts, sub-stations etc. and recording of the measurements and preparation of bills etc.

One post of Scientist 'B' is reserved for candidate belonging to Scheduled Tribe and one for Scheduled Caste. In the event of non availability of suitable candidates of these communities, the reserved posts will be filled up from amongst general category candidates. Scheduled Castes/Scheduled Tribe candidates will be judged by relaxed standards.

The selected candidates for the above posts will be posted at SERC Complex, Ghaziabad and will also be liable to be transferred anywhere in India.

The selected candidates for the posts of Scientist E.I. C, B, Information Officer and Maintenance Engineer will be appointed on Contract basis for a period of 5 years (including two years Probationary period). The post of Junior engineer (Elect) is temporary for the present but likely to continue.

Application forms for the above posts are available in the office of the Administrative Officer, 'Structural Engineering Research Centre, Roorkee-247667.' All applications duly completed in all respect should reach the Administrative Officer, Structural Engineering Research Centre, Roorkee within one month of the publication of this Advertisement alongwith Indian Postal Order of Rs. 8/- payable to Director, SERC, Roorkee (SC/ST Candidates are exempted from this fee). Applications from employees working in Government Departments, Public sector organisations and Government funded agencies will be considered only if forwarded through proper channel and with a clear certificate that in the event of selection of the candidate he/she will be relieved with in one month of reciept of the appointment order. Incomplete applications as well as those received after the due date are liable to be rejected. Those who are called for interview will be paid travelling allowance to the extent of a single second class return rail fare (Mail) or (express) by the shortest route as per rules.

The selected candidates will be liable to serve, if so required in any Defence service or post connected with the defence of India for a period of not less than four years before attaining the age of 40 years.

Candidates are required to mention clearly on the application if any of their close relative is working in SERC, Roorkee and if so, full details thereof.

Since it is not possible to call all the eligible candidates for interview/persona *discussion, the applications shall be short* listed for the purpose and the decision o the SERC in this behalf will be final and binding on all concerned.

CANVASSING IN ANY FORM AND OR BRINGING IN ANY INFLUENCE POLITICAL OR OTHERWISE WILL BE TREATED AS DISQUALIFICATIONS FOR THE POSTS. INTERIM ENQUIRIES WILL NOT BE ATTENDED TO.

INDIAN INSTITUTE OF TECHNOLOGY DELHI

HAUZ KHAS, NEW DELHI-110016

ADVERTISEMENT No. 5/86 (E.I.)

	POSITION	PAY SCALE
(A)	ASSISTANT PROFESSOR	Rs. 1200-50-1300-60-1900
	LECTURER	Rs. 700-40-1100-50-1600
	SENIOR SCIENTIFIC OFFICER GRADE I	Rs. 1100-50-1600
	SENIOR SCIENTIFIC OFFICER GRADE II	Rs. 700-40-900-EB-40-1100-50-1300.

(B) DEPARTMENT/CENTRE/PROGRAMME WHERE POSITIONS WILL BE FILLED

Department/Centre/Programme	*Position*	*Specialisation*
Department of Chemical Engineering	Assistant Professor/ Lecturer	Thermodynamics/Reaction Engineering, Chemical Engineering, Mathematics/Computer Applications in Chemical Engineering, Plant Design/Heat and Mass Transfer.
Department of Computer Science and Engineering	Assistant Professor/ Lecturer	Microprocessor, Fault Tolerant Computing, Design Automation, VLSI Systems, Pattern Recognition, Artificial intelligence, Computer Graphics, Programming Languages, Compilers Operating Systems, Data Basis Computer Networks, Distributed Processing, Design and Analysis of Algorithm, Theoretical Computer Science, Expert Systems and Robotics. (Selected candidates can also be asked to look after the work of Teacher Training Programme and the Education Programme for Professionals).
Department of Electrical Engineering	Assistant Professor/ Lecturer	Electrical Machines/Power Electronics/Power Systems, Electronics and Communications, Control and Instrumentation, Computer Engineering, Optical Communication/Opto-electronics and related areas.
Department of Textile Technology	Assistant Professor/ Lecturer	Applied Mathematics/Mechanical Engineering specifically machine Design/Electronics with specialisation in Computers and Micro-processors/Chemical Engineering with Specialisation in new fibre production techniques.
Department of Physics	Assistant Professor	Fibre [Optics, Optical Communications, Opto-Electronics.
Department of Physics (Thin Films and Solid State Technology **Lab.)**	SSO I/SSO II	Transmission/Scanning Electron Microscopy.
Centre for Applied Research in Electronics including IC Laboratory	SSO II	**Microelectronics** — Ionimplantation, Micro electronics Processing, Computer Aided Design. **Microwaves** — Microwave Integrated circuits and Millimeter wave. **Signal Professing** — Digital Hardware Design Under-water Electronics Communications.

(C) MINIMUM QUALIFICATIONS/ EXPERIENCE PRESCRIBED FOR APPOINTMENT :

(a) Assistant Professor

(i) For posts in the Departments of Chemical Engineering, Computer Science & Engineering, Electrical Engineering and Textile Technology

Good academic record with a Doctorate Degree in relevant field. About 5 years experience of teaching and/or research and development.

Provided further that candidates not possessing Ph.D. may be considered if they have to their credit equivalent research published work of design/development work of a higher order either in an Institution or an industry.

OR

In the case of persons to be recruited from Industry or Professional fields, candidates should possess good academic record with recognised professional work of about 7 years which should include innovation and/or research and development.

(ii) For posts in the Department of Physics

Good Master's degree in appropriate field with minimum 5 years experience in teaching/research in Institution of University standard, specialised knowledge in one or more specified fields/subjects with outstanding teaching/research experience/ and doctorate degree or published work of equal standard would be preferred.

(b) Lecturer

(i) For posts in Department of Chemical Engineering, Computer Science and Engineering, Electrical Engineering and Textile Technology

Master's degree in appropriate field in engineering/technology; consistently good academic record with a bachelor's degree *in Engineering/Technology. First* class at Bachelor's degree and/or Master's degree level. One year's relevant professional experience outside academic/research institutions.

Provided further that if a candidate does not possess professional experience or a person possessing such experience is not found suitable, the persons appointed will be required to obtain desired professional experience within a period of five years of his appointment failing which he will not be able to earn future increment until he fulfils this requirement.

(c) Senior Scientific Officer Grade I

Good Bachelor's degree in an appropriate field of Engineering or Master's degree in appropriate field of Science with 5 years experience in Research and Development.

(d) Senior Scientific Officer Grade II

Good Bachelor's degree in an appropriate field of Engineering or a Master's degree in an appropriate field of Science/ Arts with some experience in research and development.

Prescribed application forms may be obtained from the Deputy Registrar (Estt-I). Indian Institute of Technology Delhi. New Delhi - 110016 either in person or sending by post a self addressed stamped envelope (size 10 x 23 cms) bearing postage stamps of 95 paise latest by **2-5-1986.** Last date for submission of completed application forms alongwith crossed Indian Postal Orders worth Rs. 7.50 (Rs. 1.87 for SC/ST candidates) is **9-5-1986** in India and **16-5-1986** for candidates from abroad.

Persons employed in Government/Semi Government Organisations/Autonomous bodies must submit their applications through their employers.

INDIAN INSTITUTE OF TECHNOLOGY DELHI

HAUZ KHAS, NEW DELHI-110016

ADVERTISEMENT No. 4/86 (E.I)

A. POST & PAY SCALE

Post	Pay Scale
Professor	Rs. 1500-60-1800-100-2000-125/2-2500 + Allowances as admissible in the Government of India.

B. CENTRES/DEPARTMENTS AND SPECIALISATION UNDER WHICH POSITIONS WILL BE FILLED.

Sl. No.	Centre/Department	Post	Specialisation
1.	Department of Electrical Engineering	Professor	Optical Communication and related areas.
2.	Department of Civil Engineering	Professor	Structural Engineering, Water Resources Engineering, Soil and Rock Mechanics, Transportation Engineering and Public Health Engineering.
3.	Centre for Atmospheric Sciences	*Professor	Oceanic Studies with experience in numerical modelling in Storm Surges, Coastal upwelling and related fields; and Oceanic and Atmospheric Sciences with experience in numerical modelling related to numerical weather prediction, numerical model for storm surges and Oceanic Studies.

*Applicants for the post of Professor in the Centre for Atmospheric Sciences can also be considered for appointment as Chief Scientific Officer carrying the same pay scale as that of Professor or Principal Scientific Officer in the pay scale of Rs. 1500-60-1800-100-2000.

C. MINIMUM QUALIFICATIONS/EXPERIENCE PRESCRIBED FOR APPOINTMENT

(a) **For posts in Electrical Engineering and Civil Engineering Departments**

An eminent Scholar with published work of high quality, actively engaged in research. Ten years experience of teaching and/or research. Experience of guiding research at doctoral level.

(b) **For posts in the Centre for Atmospheric Sciences**

Good Master's Degree/Doctorate Degree in appropriate field with minimum 7-10 years distinguished teaching experience in Institutions of University standard at post-graduate level, specialised knowledge in one or more specialised fields with experience in guiding research. Professional/Scientific work of outstanding merit and Doctorate degree would be preferred.

Prescribed application forms may be obtained from the Deputy Registrar (Estt-I), Indian Institute of Technology, Hauz Khas, New Delhi-110016 either in person or sending by post a self addressed stamped envelope(size 10 x 23 cms) bearing postage stamps of 95 paise latest by **2-5-1986**. Last date for submission of completed application forms alongwith Indian Postal Orders in favour of Registrar, IIT Delhi worth Rs. 7.50 (Rs. 1.87 for SC/ST candidates) is **9-5-1986** for candidates in India and **16-5-1986** for candidates from abroad.

Persons employed in Government/Semi Government Organisation/Autonomous bodies must submit their applications through their employers.

SAURASHTRA UNIVERSITY

Applications in the prescribed forms are invited for the undermentioned posts. Application forms alongwith detailed requirement of qualifications, experience and other necessary details regarding these posts will be available from the Registrar, Saurashtra University, University campus, Kalawad Road, Rajkot 360 005, on sending a self-addressed envelope of the size 27 x 12 cms with postage stamps worth Rs. 1-90 paise for the post nos. 1 to 6 and Re. 0-90 paise for the post no. 7. Applications in seven copies for the post Nos. 1 to 6 and 1 copy for the post No. 7 should reach this office on or before **20-5-1986** alongwith crossed Indian Postal Order worth Rs. 10/- for all the posts. Qualifications, experience and specialization as mentioned in the details to be supplied with application form will be considered final.

1. **Professor of Economics—1**

Specialization in Quantitative Techniques/Econometrics or Business Management.

2. **Reader in Biosciences—1**

Specialization : at least Second Class in Botany/Zoology/Biosciences with Ph.D. in any branch of Biology.

3. **Lecturer in Physics—1**

Specialization : M.Sc. with Electronics and Ph.D. in Electronics of Ionospheric Physics.

4. **Lecturer in Commerce—1**

In addition to the qualifications prescribed the person should be M.Com. with Accountancy. Those having C A./A.I.C.W.A. in addition to M.Com. degree will be preferred.

5. **Lecturer in Economics—1**

(Likely vacancy)

Preferably specialization in Quantitative Economics, Development Economics, Agricultural Economics, Management Economics and Rural Economics.

6. **Research Scientists-B—1**

Specialization : at least M.Sc. Second Class in Botany/Zoology/Biosciences with Ph.D. in Terrestrial Ecology/Ecophysiology with atleast three years experience of conducting research in arid and semi-arid zones, as evidenced by published work. Teaching experience will be added qualification.

7. **Junior Research Fellow—3**

Temporary for a period upto three years which may be extended. NET (National Examination Test) candidates will be paid Rs. 1,000/- per month (fixed), others selected will be paid Rs. 800/- per month (fixed). Candidates must be M.Sc. in Botany/Zoology/Biosciences/Geology/Organic Chemistry or Bio-chemistry/Microbiology.

Post Nos. 1 to 6 are permanent and post No. 7 is temporary. Post Nos. 6 and 7 are for the U.G.C. Department of Special Assistance in Bioscience. Age ordinarily not exceeding 55 years. The age, educational qualifications and experience may be relaxed in suitable cases.

Pay Scales

1. For the post No. 1 : Rs. 1500-60-1800-100-2000-125/2-2500.
2. For the post No. 2 : Rs. 1200-50-1300-60-1600-Assessment-60-1900.
3. For the post Nos. 3 to 6 : Rs. 700-40-1100-50-1300 Assessment-50-1600.

V. M. Desai
REGISTRAR

SARDAR PATEL UNIVERSITY

VALLABH VIDYANAGAR (GUJARAT)

Notification No. Est/1/(1986-87)

Applications are invited in the prescribed forms available from the University office on payment of Rs. 5/- in cash or by Indian Postal Order for the following posts for Master of Computer Application course so as to reach the undersigned on or before **20-5-1986.**

Sr. No.	Name of the Post	Scale of Pay
1.	Professor	Rs. 1500-60-1800-100-2000-125/2-2500.
2.	Reader	Rs. 1200-50 1300-60-1600-Assmt.-60-1900.
3.	Lecturer	Rs. 700-40-1100-50-1300-Assmt.-50-1600.

Details of the prescribed qualifications will be supplied alongwith the application form.

All the posts carry the benefits of Dearness Allowance, Provident Fund, Gratuity and Pension Scheme as per University Rules.

Preference will be given to the qualified candidates belonging to SC/ST, Socially and Economically and/or Educationally backward classes. Candidates belonging to these castes must attach a certificate from the appropriate authority.

R.C. Thakkar
REGISTRAR

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